USAF HISTORICAL STUDIES: NO. 163

GERMAN AIR FORCE OPERATIONS IN SUPPORT OF THE ARMY

by

General der Flieger a. D. Paul Deichmann

June 1962

USAF HISTORICAL DIVISION
RESEARCH STUDIES INSTITUTE
AIR UNIVERSITY

USAF HISTORICAL STUDIES: NO. 163

GERMAN AIR FORCE OPERATIONS IN SUPPORT OF THE ARMY

by

General der Flieger a. D. Paul Deichmann

Edited by DR. LITTLETON B. ATKINSON
of the USAF Historical Division
of RESEARCH STUDIES INSTITUTE,
Air University, United States Air Force
BRIG. GEN. NOEL F. PARRISH, USAF
Director, Research Studies Institute
DR. ALBERT F. SIMPSON, AIR FORCE HISTORIAN

USAF HISTORICAL DIVISION
RESEARCH STUDIES INSTITUTE
AIR UNIVERSITY
June 1962

THIS PAGE DECLASSIFIED IAW EO12958

CONTENTS

THIS PAGE DECLASSIFIED IAW EO12958

FOREWORD

German Air Force Operations in Support of the Army, by General der Flieger a. D. Paul Deichmann, is one of a series of historical studies written by, or based on information supplied by, former key officers of the German Air Force for the United States Air Force Historical Division.

The overall purpose of the series is threefold: 1) To provide the United States Air Force with a comprehensive and, insofar as possible, authoritative history of a major air force which suffered defeat in World War II; 2) to provide a history of that air force as prepared by many of its principal and responsible leaders; 3) to provide a firsthand account of that air force's unique combat in a major war with the forces of the Soviet Union. This series of studies therefore covers in large part virtually all phases of the Luftwaffe's operations and organization, from its camouflaged origin in the Reichswehr, during the period of secret German rearmament following World War I, through its participation in the Spanish Civil War and its massive operations and final defeat in World War II.

The German Air Force Historical Project (referred to hereinafter by its shorter and current title, "The GAF Monograph Project") has generated this and other especially prepared volumes which comprise, in one form or another, a total of more than 40 separate studies, some of them in multi-volume form. The project, which was conceived and developed by the USAF Historical Division, was, upon recommendation of Headquarters Air University late in 1952, approved and funded by Headquarters USAF in early 1953. General supervision was assigned to the USAF Historical Division by Headquarters USAF, which continued principal funding of the project through 30 June 1958. Within the Historical Division Dr. Albert F. Simpson and Mr. Joseph W. Angell, Jr., respectively, Chief and Assistant Chief of the Division, exercised overall supervision of the project. The first steps towards its initiation were taken in the fall of 1952 following a staff visit by Mr. Angell to the Historical Division, Headquarters United States Army, Europe, at Karlsruhe, Germany. There, the Army was conducting a somewhat similar historical project covering matters and operations largely of primary interest to that service. Whereas the Army's project had produced or was producing a multiplicity of studies of varying length and significance (more than 2,000 have been prepared

by the Army project thus far), it was early decided that the Air Force should request a radically smaller number (less than fifty) which should be very carefully planned initially and rather closely integrated. Thirteen narrative histories of GAF combat operations, by theater areas, and 27 monographic studies dealing with areas of particular interest to the United States Air Force were recommended to and approved by Headquarters USAF in the initial project proposal of late 1952. (A list of the histories and studies appears at the end of this volume.)

By early 1953 the actual work of preparing the studies was begun. Colonel Wendell A. Hammer, USAF, was assigned as Project Officer, with duty station at the USAREUR Historical Division in Karlsruhe. General der Flieger a. D. Paul Deichmann was appointed and served continuously as Control Officer for the research and writing phases of the project; he also had duty station at the USAREUR Historical Division. Generalleutnant a. D. Hermann Plocher served as Assistant Control Officer until his recall to duty with the new German Air Force in the spring of 1957. These two widely experienced and high-ranking officers of the former Luftwaffe secured as principal authors, or "topic leaders," former officers of the Luftwaffe, each of whom, by virtue of his experience in World War II, was especially qualified to write on one of the topics approved for study. These "topic leaders" were, in turn, assisted by "home workers"--for the most part former general and field-grade officers with either specialized operational or technical experience. The contributions of these "home workers," then, form the basic material of most of the studies. In writing his narrative, the "topic leader" has put these contributions into their proper perspective.

In their authors' personal knowledge and experience these studies find their principal authority. Thus, they are neither unbiased nor are they "histories" in the ordinary sense of that word. Instead, they constitute a vital part of the story without which the final history of Germany's role in World War II cannot be written.

In preparing these studies, however, the authors have not depended on their memories alone. For their personal knowledge has been augmented by a collection of Luftwaffe documents which has come to be known as the Karlsruhe Document Collection and which is now housed in the Archives Branch of the USAF Historical Division. This collection consists of directives, situation reports, war diaries,

personal diaries, strength reports, minutes of meetings, aerial photographs, and various other materials derived, chiefly, from three sources: the Captured German Documents Section of The Adjutant General in Alexandria, Virginia; the Air Ministry in London; and private German collections donated to the project by its participating authors and contributors. In addition, the collection includes the contributions of the "home workers." Thus, the interested researcher can test the conclusions of the "topic leaders" against the basic documents or secure additional information on most of the subjects mentioned in the studies.

The authors have also made use of such materials as the records of the Nuremberg Trials, the manuscripts prepared by the Foreign Military Studies Branch of the USAREUR Historical Division, the official military histories of the United States and the United Kingdom, and the wealth of literature concerning World War II, both in German and English, which has appeared in book form or in military journals since 1945.

With the completion of the research and writing phases in 1958, the operations at Karlsruhe were closed out. At that time the project was moved to the Air University, Maxwell Air Force Base, Alabama, where the process of editing and publishing was begun under the editorship of Mr. Edwin P. Kennedy, Jr., with the overall supervision of Dr. Simpson.

The complexity of the GAF Monograph Project and the variety of participation which it has required can easily be deduced from the acknowledgments which follow. On the German side: General Deichmann, who, as Chief Control Officer, became the moving force behind the entire project, and his assistant, General Plocher; General Josef Kammhuber, a contributor to the project, who heads the new German Air Force, and who has consistently supported the project; Generaloberst a. D. Franz Halder, Chief of the German Army General Staff from 1938 to 1942, whose sympathetic assistance to the Project Officer, the Project Editor, and the German Control Group was of the greatest value; the late Generalfeldmarschall Albert Kesselring, who contributed to several of the studies and who also, because of his prestige and popularity in German military circles, was able to encourage many others to contribute to the project; and all of the German "topic leaders" and "home workers" who are too numerous to mention here, but whose

names can be found in the prefaces and footnotes to the individual studies.

In Germany, Colonel Hammer served as Project Officer from early in 1953 until June 1957. Colonel Hammer's considerable diplomatic and administrative skills helped greatly towards assuring the project's success. Col. William S. Nye, USA, was Chief of the USAREUR Historical Division at the project's inception. His strong support provided an enviable example of interservice cooperation and set the pattern which his several successors followed.

In England, Mr. L. A. Jackets, Head of Air Historical Branch, British Air Ministry, gave invaluable assistance with captured Luftwaffe documents.

At the Air University, a number of people, both military and civilian, have given strong and expert support to the project. The several Commanders of Air University during the life of the project in Karlsruhe (1952-1958) without exception were interested in the project and gave it their full backing. Other personnel at Headquarters Air University who have given freely of their time and experience include: the several Directors of the Research Studies Institute since 1952; Dr. James C. Shelburne, Educational Advisor to the Commander; Mr. J. S. Vann, Chief of Special Projects Branch, DCS/Operations; and Mr. Arthur F. Irwin, Chief, Budget Division, DCS/Comptroller.

The project is grateful to Lt. Col. Leonard C. Hoffmann, former Assistant Air Attache to Germany, who gave indispensable aid during the project's last year in Germany. Also in Germany, Mr. Joseph P. Tustin, former Chief Historian of Headquarters, United States Air Forces in Europe, ably assisted the project by solving a variety of logistical and administrative problems.

Miss Sara E. Venable deserves special thanks for her expert typing of the manuscript.

The project is indebted to all of the members of the USAREUR Historical Division, the Office of the Chief of Military History, and the USAF Historical Division who, through direct assistance and advice, helped the project to achieve its goals.

Dr. Littleton B. Atkinson, who succeeded Mr. Kennedy as Project Editor in 1961, edited the manuscript for publication.

PREFACE

The several major components of the German Air Force were the flying forces, proper, the antiaircraft artillery forces, the Air Signal Corps, the paratrooper and other air-carried forces, the air transport units, and the civilian air defense units. In this study, however, attention has been limited to the flying forces and their role of air support for the army.

Other facets of the Luftwaffe organization and operations have been dealt with in separate monographs. For example, the operations of the paratrooper and other air-carried forces will be presented in the manuscripts "Die Luftlandeunternehmung in Belgien und den Niederlanden (The Airborne Operation in Belgium and the Netherlands)," and "Die Eroberung der Insel Kreta aus der Luft (The Capture of the Island of Crete in an Airborne Operation)."* Employment of air transport units in missions of support for the army has been dealt with in "Die Lufttransportunternehmungen der deutschen Luftwaffe (Air Transport Operations of the German Air Force)."† The subject of the commitment of units of the civilian air defense services, which in part also took place in the army zones of operations, has been dealt with in the manuscript "Der deutsche Luftschutz (German Air Defense)."††

---

* Editor's Note: To be published in the German Historical Monograph Series at a later date.

† Editor's Note: Published by the USAF Historical Division, Research Studies Institue, in 1961 as USAF Historical Study No. 167.

†† Editor's Note: To be published at a later date.

ABOUT THE AUTHOR

General der Flieger a. D. Paul Deichmann was born in the ancient and famous abbatial and episcopal city of Fulda on 27 August 1898. Early in 1916 he entered the Imperial Army as a cadet in the 86th Regiment of Fusiliers, and was commissioned a lieutenant a week prior to his eighteenth birthday. In the following August he began service with flying units as an observer, and continued this duty to the end of the war. Toward the end of 1920, he was transferred to the 3rd Prussian Infantry Regiment, and in April 1925 he was promoted to Oberleutnant (First Lieutenant). Having been temporarily released from the Army in 1928, he returned to active duty in 1931 with the 1st Infantry Regiment, and was promoted to Captain in 1933. With the official establishment of the German Air Force in 1934, he entered the Reich Air Ministry, and in April 1935 was posted to the Luftwaffe General Staff, where in August of that year he received his majority. In 1937 he received a unit command: the II Gruppe of the 253rd Bomber Wing, and in 1938 he was promoted to Lieutenant Colonel.

The fatal year 1939 found him in the field of Luftwaffe training, but by August 1940 he was Chief of Staff of II Air Corps. Two years later he had attained the rank of Generalmajor (Brigadier General) as Chief of Staff to the Air Officer Commander in Chief, South (Field Marshal Albert Kesselring). By February 1943 he was Chief of Staff of Second Air Fleet, while June of that year found him commanding the 1st Air Division. On the first day of 1944 he was promoted to Generalleutnant (Major General), and was decorated with the Knight's Cross on 26 March. War's end found General Deichmann in charge of Luftwaffe Command 4.

General Deichmann's contribution to the USAF German Air Force Historical Project has been outstanding. In addition to the present monograph (and several supporting papers), he has also written monographs on the Luftwaffe systems of target analysis and weapons selection (both as yet unpublished). As if this were not enough, especial recognition is due General Deichmann for his outstanding contribution to the Project in his capacity as Control Officer from the inception of the program in 1953 to the termination of the writing phase of the Project in 1958. General Deichmann is at present the head of the Studiengruppe Luftwaffe, Fuhrungsakademie der Bundeswehr.

THIS PAGE DECLASSIFIED IAW EO12958

PART I

THE BASES FOR ARMY SUPPORT OPERATIONS

THIS PAGE DECLASSIFIED IAW EO12958

Chapter 1

THE RECORD OF GERMAN EXPERIENCE WITH AIR SUPPORT BEFORE WORLD WAR II

Operational Experience in World War I[1]

The Use of Aircraft in Reconnaissance. In Germany, aircraft had produced good reconnaissance results and had proved their value for the command and troops as early as 1911, during the Kaiser maneuvers and during maneuvers held by the XVIII Corps. By the outbreak of World War I in 1914 this experience had led to the establishment of 33 field air battalions (each comprising 6 aircraft) and 10 fortifications air battalions. By the end of World War I the reconnaissance strength of the German Army had grown to include: a) 31 air battalions, with a total authorized strength of 90 Type C aircraft;* b) 99 Type A air battalions (also suitable for artillery reconnaissance), including 5 air photography battalions, with a total authorized strength of 705 Type C aircraft; and c) 6 Pascha air battalions (Nos. 300-305), committed in Turkey, with an authorized strength totalling 36 Type C aircraft. Thus, the aggregate total of all aircraft available for normal and artillery reconnaissance numbered 831.

By 1917 certain concepts had evolved on the employment of air reconnaissance units. Generally speaking, strategic (or long-range) and tactical (or close-range) reconnaissance missions were to be flown by single planes. Air units were to fly systematic reconnaissance patrols in the far enemy rear to furnish data for timely and effective counter action against the enemy or for the execution of plans prepared by their own command. The mission here was to furnish information on the following points: a) All enemy movements in the enemy rear; b) the forward movement and assembly of enemy reserves, tanks, other armored units, and large cavalry forces; c) the disposition of enemy artillery; d) the movement of attack troops into jump-off or assault trenches; e) the placing and effectiveness of friendly artillery fire; and f) the location of friendly front lines. All reconnaissance information thus furnished was to

---

* Editor's Note: Aircraft with observer's seat behind the pilot.

be substantiated by air photos.

The Use of Aircraft in Air Combat. As early as the winter of 1914-15 the French commenced using aircraft armed with machine guns to combat German reconnaissance planes, which were armed only with rifles and pistols, to prevent the execution of reconnaissance missions. German air units suffered heavy losses as a result, and were no match for French aircraft in air-air combat.

A captured French fighter plane developed specifically for air-air combat was to provide the starting point for the establishment of a completely new air arm. Inspired by the captured plane, the German side constructed a single-seater fighter plane, the Fokker fighter, armed with a machine gun rigidly mounted to fire through its propeller in the line of flight.* This development created a new mission for the air force, that of offensive combat action in the air to achieve air superiority.

The new branch of air combat grew from about 40 aircraft in December 1915 to some 58 fighter squadrons in 1917. And by war's end there were 81 fighter squadrons with an authorized strength of between 1,134 and 1,926 aircraft. Some of these squadrons were consolidated in wings, the most famous of which (there were only two such wings) was named after Freiherr Manfred von Richthofen, the most successful German fighter pilot of those days.

When current circumstances required, fighters operated in unit formation, organized in flights of two or three planes, squadrons of nine or ten planes, and wings comprising a number of squadrons. Air battles were fought with machine guns. The advantage in combat

*Editor's Note: The captured French plane was a Morane-Saulnier "N" scout, with a Lewis gun mounted so as to fire through the propeller. In order to prevent bullets damaging the propeller, triangular metal deflector plates were fastened to each blade. Faced with a revolution in air warfare as represented by this simple but effective French device, the German authorities called in Anthony Fokker to design a similar device. From the French improvisation Fokker conceived the idea of a machine gun synchorized to fire through the propeller, thus eliminating the deflector plates. Henri Hegener, Fokker - The Man and the Aircraft (Letchworth, Herts, England, Harleyford Pubs., 1961) pp. 24-25.

was with the airman who succeeded in attacking his opponent from above in the rear and from as close a range as possible. Beginning in unit formation, air battles usually broke up into individual actions. The mission of the squadron leader or wing commander was to keep his aircraft together if at all possible and, above all, to carry out the approach and home flight in closed formation.

The Use of Aircraft for Attack Against Ground Targets in Rear Areas. Tests had been carried out in 1914, even prior to the outbreak of World War I, to determine the possibility of air attack with bombs against ground targets. In some cases test models of bomb sighting instruments had even been tried out. At that time, however, it was still not possible to apply air bombing systematically and in any sizable scope as a means of warfare.

In November 1914 the first unit intended specifically for bombing missions was activated under the cover designation of Carrier Pigeon Battalion Ostende (Brieftaubenabteilung Ostende) and placed under direct control of the Army High Command. The unit was formed from the best air pilots available and particularly well qualified airborne observers. Plans provided for each lead plane during operations to take along an observer; all other planes were to carry a corresponding load in bombs. By March 1915 the new bomber wing of the Army High Command had already grown to the size of six squadrons of six planes each. Soon thereafter another wing, Carrier Pigeon Battalion Metz, was formed after the same pattern, followed soon by three further wings of the same type and six independent squadrons. The new units now were designated Bomber Wings of the Army High Command, Numbers 1-5. In order to secure to these units the greatest possible measure of flexibility in operations, so that they could be employed wherever needed in current areas of main effort, they were assigned special railway trains, some to serve as quarters for personnel, others for the transportation of their equipment. The mission of the units was to wage long-range air warfare in the enemy rear, in the form of attacks against enemy airfields, ports, and rail junctions.

Plans to employ the first of these bomber wings, Carrier Pigeon Battalion Ostende, against Britain never materialized because of the failure to gain control of the Channel coast at Calais. Thereupon the wing was transferred late in April 1915 to Krakow, Poland. Based on airfields near that city the 20 planes which the

wing comprised supported the German offensive in Russia with resounding success by attacking targets in the enemy rear.

However, the first real successes were achieved by the new arm in 1916, when some elements of the bomber wing received large twin-engine planes, and the first squadrons received what were called giant aircraft in those days. From 1916 on these units constituted the hard core of German air armament. On 13 June 1917 the 3d GHQ Bomber Wing succeeded for the first time in carrying out a bombing attack against London. This operation was followed by numerous attacks against other targets in Britain. Shortly before the end of the war a large-scale attack against London was planned, in which several hundred thousand 2.2-pound electron incendiary bombs* of a completely new type were to be delivered on the target for the purpose of starting major conflagrations. The attack was disapproved by the Army High Command since it could have produced no change in the military situation, which meanwhile had become extremely unfavorable for Germany.

After several organizational modifications carried out in the last two years of the war, the German Army High Command at the end of the war had available 8 bomber wings, totalling 27 squadrons, with a total authorized strength of 162 large aircraft, and 2 super-large air battalions (Nos. 500 and 501) with an actual strength of 6 giant aircraft.

The bomber forces consituted an arm developed exclusively in line with the basic principles governing air warfare. This arm was under direct control of the Army High Command, which at the same time was the highest authority for the conduct of air warfare.

Initially the arm was employed altogether in strategic missions, for example, against Britain. It was in no way directly connected with military operations on the ground or, if related to ground operations, was used against targets distant from the actual field of battle. The ability to move quickly made it possible to concentrate the units at points of main issue as the current military situation required. Current techniques of employment provided that

* Editor's Note: This incendiary bomb was named after a German trade name, Elektron.

bomber wings would attack their assigned targets either in compact wing formation or in a sequence of squadrons. If circumstances required, individual bombers could also be dispatched on attack missions, but, in general, bombing was to take place by squadron at set intervals.

Participation of Aircraft in Combat on the Ground. After the change introduced in 1915, in which the reconnaissance aircraft generally in use at the time were provided with a light, air-cooled engine, efforts were successful in the summer of 1916 in producing adequate numbers of reconnaissance aircraft suitable for combat employment which were armed with two machine guns. One gun was rigidly mounted with a forward line of fire, the other being placed on a swivel mount for rearward and flank fire by the air observer. With this new development it gradually became habitual for aircraft flying over enemy terrain at a low altitude to attack ground targets with weapons fire. Good results were obtained in such action on some occasions. However, it was to be some time before complete units were committed in missions of this type.

On 10 July 1917, during a German attack in the coastal areas of Flanders in the zone of the German Fourth Army, a complete bomber squadron from one of the GHQ bomber wings had been committed in close support of the infantry during the actual assault. The results, both in the form of the effects of weapons fire and in that of the impact on the enemy morale, were so impressive that the German Command took an important step in this new field. It was decided to adapt the escort squadrons, established in 1916 to provide protection for reconnaissance units, as ground support squadrons. The mission of these units was to operate together with infantry forces in attack, supporting the infantry by action against the enemy artillery batteries, bases, and reserves both with bombs and with weapons fire.

On 1 November 1918 the German Air Force had more than 38 ground-support squadrons in service, with a total authorized strength of 228 aircraft. Some of these squadrons were consolidated in wings.

Since the mission of the ground-support air forces was to participate in ground combat, they were to go into action the moment the infantry forces left their trenches, bringing movement into what was otherwise positional warfare. This was the time when the

majority of the enemy machine guns, which could prove a threat to low-flying aircraft, would be occupied in delivering fire against the attack on the ground. The ground-attack air forces were to attack in squadron-size waves, striking successively at all points of resistance to the infantry advance on the ground. If at all possible, all other types of aircraft also participated in such attacks--including fighter squadrons, individual planes, and infantry and artillery air reconnaissance units. The basic principle here was that in battle all air forces would participate with bombs and machine guns, either in attack or to provide protection for the infantry on the ground against enemy air attack.

The following maxim, which was in force in 1916, gives the best description of cooperation between the air forces and the army forces in World War II as well as World War I: No battle must be fought on the ground without the Air Force making its honorable contribution.

Command Control of the Air Force in World War I. Although the air forces and antiaircraft artillery forces at that time were organic to the Army, it became evident even in World War I that a separate command organization was necessary to control these forces in coordinating their operations with those of the normal army forces. Without going into details on the evolution of the system or the various initial and subsequent intermediary solutions tried out, it is desirable at least to depict the principal organizational arrangement which obtained at the end of the war.

In a Cabinet Order dated 8 October 1916, responsibility for the "uniform development, readying, and employment" of all German means of air combat and defense in the field and in the zone of interior was assigned to a Commanding General of Air Forces. This officer was placed under direct control of the Chief of The Army General Staff with Troops (Chef des Generalstabes des Feldheeres). In each field army headquarters a staff was organized under a Commander of Tactical Support Air Units (Kommandeur der Flieger), with the appropriate tactical command authority over the air forces committed within the command zone of the army concerned. In major segments of the front air group commanders were attached to the appropriate corps headquarters operating in the areas of main effort. Air liaison officers were attached to other corps headquarters, and to divisions operating in the areas of main effort.

THIS PAGE DECLASSIFIED IAW EO12958

Recommendations to Establish the Air Force as a Separate Service. Early in 1916 the Field Air Commander--a position which later developed into that of a Commanding General of Air Forces--submitted to the Chief of the Army General Staff plans calling for consolidation of all air forces intended for counterair action and for air action against targets on the ground, both in the field and within the zone of interior, to form what was to be called the Imperial Air Forces. This was to give the air forces one single highest command agency controlling the combat forces, their organization, training, administration, and operations, and was to make the air forces a third and separate branch of the military forces beside the Army and the Navy. General von Falkenhayn, at the time Chief of the Army General Staff with Troops, approved the recommendations and supported the plan wholeheartedly.

Realization of the plan was prevented, however, by the various German States, each of which had its own contingent of air forces, because of their fear that an infringement of sovereign rights would take place. The only thing which could be achieved was the establishment of a uniform operational control by a Commanding General of Air Forces, as previously described, on 8 October 1916.

On 1 April 1918 Britain established her Royal Air Force, but eighteen years were to pass before Germany adopted the system which had long been recognized as the only appropriate organization.

Impact of the Treaty of Versailles on the German Air Forces. When the Armistice ending hostilities after World War I was signed on 11 November 1918 the German air forces comprised 290 squadrons (battalions as they were called at the time), with a total authorized strength of 2,709 aircraft of all types. This force was manned by 4,500 flight personnel--including officers, noncommissioned officers, and men--as air pilots, observers, gunners, radio operators, and mechanics. Events in the war had proved the extreme importance of the air forces for the Army, so that it was a severe blow when the treaty of Versailles permitted the maintenance of an army with a strength of 100,000 officers and men, but denied this army any aircraft at all. This reduced the combat value of the army to a minimum.

The Chief of the German Army Command at the time, nevertheless, ordered that a number of particularly well qualified air

officers be enrolled in officer assignments in the new 100,000-man army. This wise precaution was later to have an excellent influence on cooperation between the Army and air forces.*

Provisions in the New Army for Future Establishment of an Air Component

Preparatory Planning, 1926-33. Even during the period in which the new German Army had no aircraft at all, the armed forces gave attention to a study of the problems of air warfare. The initial point for all new planning had to be the basic concepts of the missions which would be assigned to an air force, and the nature of its employment, in the event of armed conflict. As early as 1926 the General Troops Office of the Reichswehrministerium, as the ministerial department for military affairs was called, issued an appropriate memorandum on the subject under the heading "Directives for the Conduct of Operational Air Warfare." Since the German military forces were not permitted to have aircraft, the memorandum for reasons of concealment had the subtitle: "Compiled from Publications of Foreign Air Forces." But in reality the memorandum represented for the German military forces the currently valid views on doctrines governing the employment of a modern air force.

A few years later this memorandum was supplemented by the addition of individual pamphlets on the various missions of those air elements required to cooperate directly with ground forces, stapled in a firm cover permitting the removal and exchange of the pamphlets, and issued to the troops. Since the cover and the individual pamphlets were green, and because of its long title, it was generally referred to by the troops as the "Green Mail" (Gruene Post), a title similar to the official title of a weekly paper published on agricultural matters. The whole purpose of these publications continued to be concealed by the statement that the contents were from publications by foreign

* Editor's Note: The number of experienced air officers was insufficient, however, for the needs of the Luftwaffe when it was re-established in the 1930's. Albert Kesselring, Kesselring, A Soldier's Record (New York, 1954), p. 23. See also Richard Suchenwirth, Historical Turning Points in the German Air Force War Effort, USAF Historical Studies No. 89, pp. 1-2, 15-16.

air forces.

Pursuant to instructions from the newly established Air Ministry in 1934, a special staff under General Helmuth Wilberg* prepared the field manual known as "The Conduct of Air Operations" (Luftkriegführung), Air Field Manual No. 16, which was first issued in 1935./ With minor modifications, the new field manual was the established doctrine governing the conduct of air operations in the Luftwaffe at the outbreak of war in 1939. It contained all the basic concepts on the subject of cooperation of the air forces with the Army.

Above all, it should be emphasized that the principles expounded in this field manual were the ruling factors in the organization of the new German Air Force.

Missions for the Planned New German Air Force. Air Field Manual No. 16 envisaged the following missions for the Luftwaffe:

a) Combat action to secure and maintain air superiority. This was considered a continuing mission even at times when the Luftwaffe was required to devote its attention to the other missions.

b) Combat and other air action in support of the army forces on the ground.

c) Combat and other action in support of the Navy or the conduct of independent air warfare at sea.

d) Action to interdict routes of communication, such as rail, waterway, and road routes, leading to or from the front areas or used in the movement of imports or supplies for industrial

---

* Editor's Note: Lieutenant General (General der Flieger) Wilberg was killed in an accident in 1941. He had served in World War I as Chief of Tactical Air Command, German Fourth Army, which was committed in the area of main effort in the western theater.

/ Editor's Note: Hereinafter referred to as Air Field Manual No. 16.

installations.

e) Strategic operations against hostile sources of military power.

f) Attacks against targets located within large cities as centers of government and administration, and as centers of military control and training; in certain circumstances attacks for retaliatory purposes.

From the above it can be seen that the requirement to furnish air support to the Army was only one of several missions envisioned for the Luftwaffe. A point that should not be lost sight of here, however, is that the Luftwaffe would support Army operations, even if only indirectly, through the accomplishment of some of its other missions, such as action to secure and maintain air superiority or the conduct of operations against the rear communications of an enemy and against hostile sources of military power.

Army Support as a Mission of Airpower. It is only natural that the Army expected maximum air support, the nature and scope of which was expected not to be smaller than in World War I. Commensurate with the increased combat capabilities of aircraft it was expected, rather, that the effectiveness of such support would be far greater. To the Army, aircraft appeared to be a particularly suitable vehicle of transportation for observers and for combat personnel from all arms in the execution of certain types of missions. For such purposes it was considered superior to any other form of transportation. With the good opportunities for observation from aircraft, it was possible to take up observers and cameras for the purpose of securing reconnaissance data. Likewise, the weapons with which aircraft were armed could be used to attack fast moving and particularly small targets, which otherwise could only be attacked by observed or aimed weapons fire from the ground. Because of the great speed at which they could travel, aircraft could be used to move weapons in order to develop concentrations at particularly critical points. The relatively long range of aircraft made possible the speedy transportation of weapons into far rear areas for use against targets invulnerable to the limited range of ground weapons fire. The large carrying capacities of aircraft furthermore made it possible to transport troops and supplies speedily over long distances, and also made them highly suitable for

the movement of personnel and materiel as courier planes.

As World War I had shown, certain of the features mentioned above also contributed to make certain types of aircraft a weapon equally or more effective than other weapons for combat action against hostile aircraft. Support by fighter aircraft made it possible to prevent enemy air reconnaissance, and thus protect friendly ground forces against the harmful results of such reconnaissance; it also held out prospects of success in combat against enemy aircraft in preventing action against friendly ground forces. The feeling of security against enemy air attack stimulated the combat efficiency of troops on the ground and of an army as a whole quite considerably. Furthermore, the visible support given by aircraft to troops in combat action on the ground greatly improved combat morale in a manner unachievable by any other means and often far exceeding the actual material results achieved by air combat action.

In summary, the following missions evolved for air power in support of the Army: 1) The conduct of air reconnaissance; 2) action to protect army forces and installations against enemy air reconnaissance and enemy air attack; 3) support of Army ground forces through attacks against targets on the ground; and 4) air transportation and liaison and courier services. Of these missions, the first two were deemed to be continuing tasks of the air forces, whereas the two latter missions were considered as tasks to be performed from case to case as required.

Thus the essential problem involved in future development becomes evident. In any reestablishment of a German Air Force it would be essential, through a synthesis of past experience and existing and envisaged future capabilities, to find a solution which would enable the renascent force to accomplish its numerous missions and, if required, to render the Army maximum support.

THIS PAGE DECLASSIFIED IAW EO12958

Chapter 2

PRACTICAL IMPLEMENTATION OF ORGANIZATIONAL, METHODOLOGICAL, AND TRAINING THEORY

An Independent Luftwaffe and Its Relations with the Army

Designing the Mission of the Luftwaffe. In establishing the new German Air Force in 1934, the German command followed a course similar to that suggested by the Field Air Commander in 1916 to "consolidate all elements operating in the air against the enemy, and so create an Air Force as a third branch of the Armed Forces." No evidence has been found, however, which connects the planning which took place in 1916 with the realization of those ideas in 1934. It can be assumed, nevertheless, that persons such as Thomsen,* who served as an advisor in the development of the new Luftwaffe, Wilberg, and Goering,/ still had the plans of 1916 in mind. The new plans went a step further, however, by including in the Air Force the antiaircraft artillery forces designed "for action against targets in the air."

In spite of the impact of the much-discussed theories of Douhet on general lines of thought, those who defined the missions and the required strength of the new Luftwaffe recognized properly the existing capabilities of airpower and its technical limitations. Consequently, they did not go so far as to require that the new and independent Luftwaffe alone should be assigned the mission of bringing about a decision through offensive action in war, while the Army and Navy were assigned only defensive missions.

On the contrary, the idea was to have a Joint Armed Forces High Command, under which the operations of the Army, the Navy,

---

* Editor's Note: Lieutenant General (General der Flieger) Hermann Thomsen died in 1942.

/ Editor's Note: Hermann Goering, World War I commander of the famous Richthofen Fighter Wing and future Reichsmarschall, was Reichs Minister of Aviation in 1934.

and the Luftwaffe were to be so coordinated that they would serve one common purpose "to break the combat power of the hostile military forces." The basic regulations contained in Air Field Manual No. 16 established certain principles in this field in paragraphs 9, 10, and 30:

> The mission of the Armed Forces in war is to break the will of the enemy.
>
> The will of a nation finds its strongest expression in that nation's military forces. Defeat of the enemy military forces is the primary objective in war.
>
> The mission of the Luftwaffe is to serve this purpose by conducting air warfare as part of the overall pattern for the conduct of the war.
>
> Decision in war can be brought about only through the combined efforts of all three branches of the military forces.
>
> By coordinating the operations of the Army, the Navy, and the Luftwaffe, and through appropriate shifts of emphasis within the military forces as a whole, the Supreme Command endeavors to achieve maximum overall effectiveness.

From the above it can be deduced that the Luftwaffe, in its organization and strength, was designed and prepared only for the execution of this circumscribed mission within the whole team of military forces. Had the intention been that the Luftwaffe alone, without support from the other two branches of the military forces, was to bring about a decision in war, it would have had to be given far greater strength. Because of the limited resources available to Germany, this could only have been done at the expense of the Army and the Navy.

It was foreseen, however, that a situation might develop during war in which a change in the balance of forces might be the only possible means to bring about a final decision. The measures necessary to bring about such a change could not have been taken, however, without complications arising. Raw materials, manpower, and machine tools would have been required on a large scale. The

training program would have had to be expanded and adapted to the new requirements. All of this would have taken a number of years. Air Field Manual No. 16 mentioned, in paragraph 31, possibilities of this type which might arise under certain circumstances:

> In addition, if operations should come to a standstill on the ground, the Luftwaffe might be the only weapon capable of preventing the ground forces from being bled white, and the only means to bring about a decision.
>
> In such a case the primary condition of success would be a complete shift of emphasis to the conduct of air warfare, at the expense of all other means of warfare.
>
> Such a complete change in the conduct of warfare requires time. As a precaution, preparations must be made in advance.

It is worthy of note here that towards the end of the 1940 campaign in France, Hitler toyed for a short while with the idea of disbanding twenty Army divisions and putting the personnel to work in the aircraft industry in order to enable the Luftwaffe alone to decide the issue in the war against Britain. However, these intentions were not put into effect. Probably Hitler had second thoughts in view of the time required to reequip the Luftwaffe appropriately, and therefore decided on war against Soviet Russia instead.

Airpower as a Unified Weapon at the Point of Main Effort. It was only natural that responsible circles in the Army and Navy demanded that these two branches of the military should have their own air forces, separate from the operational air forces of the Luftwaffe. Limited resources in raw materials, manpower, and funds available, however, led the highest command authorities to establish only one uniformly controlled air force, and to make other arrangements regulating air support for the Army and Navy.

In addition, past experience had shown that the system of subdividing the air force, particularly the combat elements, had resulted unavoidably in a dispersion of effort in operations, thus canceling out the important advantages of high flexibility, mobility, and the capability of swift development of power concentrations so characteristic of airpower.

THIS PAGE DECLASSIFIED IAW EO12958

The most important advantages of airpower could be exploited only through a firm concentration of all air elements suitable for combat action, so as to be able to develop power concentrations successively in areas widely separated and in accordance with the requirements of current situations. Only through a firm consolidation would it be possible, when the occasion required, to commit the large bulk of all available forces of the Luftwaffe in support of individual armies in order to force a decision in battle or to protect the ground forces against threatened destruction.

Development of the Command Organization

Wehrmacht High Command as the Highest Command Authority. Since neither the Army nor the Navy were to have air units of their own, but would rely on the Luftwaffe for air support, and since the Luftwaffe would have numerous missions to execute, it was necessary to have an impartial command authority at a level higher than all three branches of the armed forces. This headquarters would have to decide from case to case on the type, scope, and duration of the support the Luftwaffe would be required to give the two other branches. Air Field Manual No. 16 provided for this contingency in paragraph 11: "How the most effective results can be obtained towards a decision in warfare, and which missions must receive current priority, can be decided only within the overall pattern of the existing military situation. After a careful consideration of all military, political, and economic factors involved, it must be decided which is the currently most important target." The supreme command organization necessary for this purpose was available to the German military forces in the form of the Wehrmacht High Command (Oberkommando der Wehrmacht), usually referred to as OKW. On the subject of the responsibilities of the Wehrmacht High Command, Air Field Manual No. 16 observed: "In such case the Commander in Chief of the Wehrmacht will coordinate the desires of the Army with the other missions of the Luftwaffe and thereby will determine the size of the Luftwaffe forces to be committed in support of operations on the ground."*

* The Luftwaffe included not only the air units, but the anti-aircraft artillery forces as well.

In line with directives from the Wehrmacht High Command that the Luftwaffe was to support the Army, it was necessary to have a centralized command authority of the Luftwaffe to issue the necessary directives to the higher levels of the Luftwaffe field commands, regulating the type and scope of the support to be given, and determining the forces to be assigned for the purpose. This was a responsibility of the Luftwaffe High Command, which also was required to effect the necessary arrangements and agreements with the Army High Command.

Higher Luftwaffe Field Commands Required to Render Army Support. Under the Luftwaffe High Command two types of Luftwaffe headquarters existed for the purpose of securing action in support of the Army.

1. The Luftwaffe headquarters assigned under Army commands. These headquarters controlled only those air and antiaircraft artillery units allocated to them and which were under tactical control by the Army.

The assignment of Luftwaffe commands to the Army was in line with the organizational setup of World War I, under which the following posts had existed: 1) A Luftwaffe General Attached to The Commander in Chief of the Army; 2) a Commander of Tactical Air Support Forces assigned each army group and army level headquarters; and 3) air liaison teams or air liaison officers attached to Army corps or divisions operating in areas of main effort. These headquarters and officers set forth above served as advisors to the appropriate Army commands to which they were attached and exercised administrative and disciplinary control over the Luftwaffe units allocated to the Army.

In contrast with the Army, which considered aircraft nothing but a means of transportation serving to move observers, cameras, or weapons to enemy territory, the Luftwaffe held the view that the use of aircraft was subject to special conditions and circumstances which could not be compared with those of other arms.

The differing technical capabilities of the various types of aircraft, differences in the training of aircraft crews in accordance with the aircraft types involved, the influences of weather conditions

THIS PAGE DECLASSIFIED IAW EO12958

on the conduct of air operations, the quick changes to which the air situation was subject, the special signal communications service required, the measures needed to secure air traffic safety, and the technical qualifications required necessitated that appropriately trained officers of the Luftwaffe should be the persons who directed the operations of air units.

For the above reasons even those units of the Luftwaffe which were assigned to permanent support missions with the Army were placed under headquarters staffed by Luftwaffe personnel. The requirements for this arrangement could be met through the organization previously described.

Under this arrangement, the Luftwaffe units were assigned to the Army only to the extent that the appropriate army headquarters assigned them their missions, prescribing what task they wanted performed, or what purpose the desired action was to serve. Execution of the air mission was then an exclusive responsibility of the Luftwaffe headquarters or air units concerned.

In 1942 the Luftwaffe headquarters assigned under army commands were deactivated, and their mission was taken over by the headquarters of the operational air forces, in addition to their other responsibilities. The purpose of this measure was to economize in staffs and manpower. Cooperation between the various headquarters of the operational air forces and the various Army commands had in the meantime become so close (and the Luftwaffe commands had adapted themselves so well to the organizational setup of the Army) that it was thought this step could be taken without harmful effects. The various air fleets now attached air liaison teams to the headquarters of the army group and army headquarters concerned.

2. The higher level headquarters of the operational air forces. These headquarters, whenever necessary, were required to furnish temporary support to the Army concurrently with the execution of their other missions.

In order to insure that, if the occasion required, only one Luftwaffe headquarters would be involved currently in cooperation with any one army headquarters, the arrangement was to establish the boundaries of air fleets in war with those of the army groups in

such a manner that one air fleet headquarters would be assigned to cooperate with each army group.

At the level of the field army, it was not possible to adapt zones for air operations permanently to the zones of the individual armies. This would have resulted in too many staffs and in a dispersion of the forces of the Luftwaffe, and thus would have been contrary to the basic principle of air operations, namely, the use of airpower in power concentrations. For this reason, the individual unit commanders of the air units assigned to an air fleet had to be assigned to cooperate with and support the individual armies of the army group concerned. Such missions were assigned to air corps, air divisions, or lower air commands temporarily as the situation required.

Luftwaffe Forces Allocated Permanently to the Army

Air support, in accordance with directives from the Wehrmacht High Command, was to be a responsibility primarily of the operational air forces. As we have seen, however, it was thought necessary up to 1942 to assign the Army a certain number of air units permanently, at least during war. Air Field Manual No. 16 provided for this in paragraph 121:

> Direct cooperation with and direct support of the Army are missions primarily of those units of the Luftwaffe which are allocated to and assigned under the Army for reconnaissance and air defense purposes. The type of forces in question include reconnaissance, antiaircraft artillery, aircraft reporting, and, if the current situation on the ground requires and the overall situation permits, fighter forces.

Accordingly, a certain number of long- and close-range reconnaissance units and antiaircraft artillery and aircraft reporting companies were assigned under army command. No fighter units were thus assigned, as will be discussed later while on the subject of fighter forces.

As previously pointed out, the system of assigning units to the Army and placing them under Army control was discontinued in

1942. All such units were from then on assigned to the operational air force commands and employed by them as in the past in support of the Army.

Development, Production, and Utilization of Tactical Reconnaissance Aircraft. At the outbreak of war thirty tactical, or close-range, air reconnaissance squadrons were available to the Army. This meant that the Army had enough such units to assign one to each of its corps for purposes of normal tactical and battle reconnaissance, and for use as artillery spotting planes.

Up to the beginning of the Russian campaign in 1941 there were 36 of these tactical air reconnaissance squadrons in existence, although each contained only 7 aircraft, in addition to 20 squadrons of 6 aircraft each intended for assignment to major armored units for reconnaissance. In succeeding years, the number of squadrons was relatively stable, with a monthly average of 29 in 1942, 32 in 1943, and 30 in 1944.*

In view of the rapid build-up of the Luftwaffe it is only natural that use was made of every available type of aircraft that could be used in any way for military purposes. Among the military aircraft developed by the Reichsheer (Germany's post-World War I 100,000-man army) under the difficult conditions resulting from the necessity to circumvent the terms of the Diktat of Versailles (which prohibited the construction of military aircraft) were the Heinkel 45 (He-45) and Heinkel 46 (He-46) reconnaissance models./ In 1939, most of the squadrons had three He-45's and six He-46's, plus another three He-46's in reserve. That they were still in use by front line units in 1939 and participated in the Polish campaign is all the more surprising in that all other branches of the air forces, such as long-range reconnaissance, bomber, and fighter units had aircraft models

---

* Editor's Note: Statistics showing monthly figures are available in the original manuscript and the translated draft of USAF Historical Study No. 163. Karlsruhe Document Collection.

/ Editor's Note: Technical data in unpublished appendices, USAF Historical Study No. 163. Karlsruhe Document Collection

by the outbreak of war which were at least equal to and in some cases superior to those of the enemy.

In addition, each squadron had three Fieseler 156 (Fi-156) (Storch) liaison planes and one Junkers W-34 or other appropriate type of transport plane.

The He-46 had been developed in 1930 according to specifications established by the General Staff of the Reichsheer under the difficult conditions imposed by clauses of the Treaty of Versailles prohibiting German construction of military aircraft. Development had reached the production stage in 1933. The speed, operating range, and operating maximum altitude of this plane were inadequate for tactical reconnaissance missions. The plane was extremely sensitive to weapons fire, and its armament with a rearward field of fire was too weak. Its lack of armor plating limited its usability as a battle reconnaissance plane and was to result in heavy losses as early as the Polish campaign. The plane also lacked the essential features for blind or instrument navigation and was therefore unsuitable for bad weather or night operations. Owing to all of these weak points, the He-46 could only be used within strict limitations for tactical reconnaissance purposes. On the other hand its rugged construction made the plane highly suitable for operations from provisionally prepared field airstrips. As a semi-high-wing plane it also had a good forward field of vision. On the whole, however, this model was obsolete by the time the war began, so far as its technical capacities were concerned, and it was almost an irresponsible act to commit it in combat action.

The He-45 was also a model designed according to 1930 specifications of the General Staff of the Reichsheer as a combination long-range reconnaissance plane and light bomber. It was ready to go into production in 1933. Since the striking range of the plane was no longer adequate for cooperation with mobile ground forces, all planes of this type were transferred in 1935 to the tactical reconnaissance squadrons, each squadron receiving three. As a tactical reconnaissance plane the He-45 was barely adequate for requirements in the Polish campaign, but its usefulness for tactical missions was very limited because it was not suitable for blind or instrument navigation. It was also extremely vulnerable to weapons fire, and its own

rear firepower was too weak.*

The Henschel 126 (Hs-126),/ designed and developed in accordance with Luftwaffe specifications and intended to replace the He-46, was ready to go into production in 1938. Only enough of these planes were available by the outbreak of war partially to equip the tactical reconnaissance squadrons with them for the Polish campaign. It was only prior to the 1940 campaign in the west that enough of these new aircraft were available to equip all squadrons.

The Hs-126 was an all-metal high-wing plane, and, in contrast with the He-45 and He-46 (which were of mixed steel-wood-fabric construction), it had the advantage of being weather-resistant. This obviated the necessity for protective tents to be carried along and facilitated camouflage in open terrain.

In point of technical capabilities, particularly in respect of speed performances at medium and high altitudes and climbing ability, the Hs-126 was a great improvement over the He-45 and He-46 models. It required only a short take-off and landing runway, and its flight properties were normal. The new plane was also far less vulnerable to weapons fire, since its fuel tank was protected with armor. During the Polish campaign armor plate protection was also installed for the pilot's seat and for the fourth section of the fuselage (where the observer was seated) against weapons fire from the rear. But there was no protection against ground fire. Its weapons were the same as the former models, and rearward fire was inadequate. In addition, there was a conditional capability for blind flight, that is, after the necessary navigational and radio equipment had been installed. With all the above features, the Hs-126 was thus a rugged, weatherproof plane, reliable for use in tactical and battle reconnaissance. It met

---

* A new model, the Hs-122, developed by the firm of Henschel on its own initiative in 1935 and offered to the Luftwaffe as a close reconnaissance plane, was not placed in serial production by the Reich Air Ministry because its performance was not much better than the He-45 or He-46.

/ Editor's Note: Technical data in unpublished appendices, USAF Historical Study No. 163. Karlsruhe Document Collection.

THIS PAGE DECLASSIFIED IAW EO12958

all requirements in the Polish and Balkan campaigns and in the 1940 campaign in France. But from mid-1941 on it was no longer suitable for commitment against the more modern types of fighter aircraft introduced in the meanwhile.

That the output of the Hs-126 was too small is evident from the fact that for the Russian campaign the authorized strength per tactical reconnaissance squadron had to be reduced from nine to seven, and in the case of squadrons intended for panzer divisions to only six. The requirement of three additional planes in reserve had to be suspended. Owing to this inadequate output the operable strength of tactical reconnaissance squadrons declined by the end of 1941 to a minimum: in the command zone of Army Group South, for example, to an average of one plane.

One reason why the development of tactical reconnaissance planes was not promoted as energetically as that of other military types was that, because of the political situation, efforts were to be directed first at the build-up of the combat air forces to serve as a deterrent to war. Another was that Hitler had assured the military commands there would be no war before 1942. Another important reason for the neglect of the tactical reconnaissance arm was that the Army air forces during the time of the military build-up had no top level command authority of their own invested with the necessary powers of command. Such an authority was only established in March 1939 in the form of a "Commander of Army Air Forces and Luftwaffe General Attached to the Commander in Chief of the Army," who controlled all long-range and close-range air reconnaissance units allocated to the Army. Prior to the establishment of this new position these units had been grouped together under the various air divisions of the operational air forces. It was only natural that these division headquarters did not take as great an interest in the units which would not remain under their control in time of war as they did in their own bomber and fighter units.

The section formally responsible for supervision and development of all air reconnaissance forces, both those with the Army and those with the operational air forces, was the Inspectorate of Air Reconnaissance Forces and Air Photography within the Reich Air Ministry. This section was also required to develop the specifications, both tactical and technical, for further development of aircraft to be

used for reconnaissance purposes. However, the decision whether the requirements stated by the section were to be put into effect and included in the general development program was made by the Luftwaffe General Staff, which had to coordinate them with the stated requirements of the other arms inspectorates, namely, the bomber and fighter inspectorates and bring them into alignment with its own views and with the requirements of the other arms and inspectorates for negotiations with the Technical Office.

The difficulties encountered by the Inspectorate of Air Reconnaissance Forces in efforts to have its requirements met are illustrated by the case of the Focke Wulf 189 (FW-189).* This plane was developed in line with the specifications laid down by the inspectorate in 1937, and was completely developed for serial production in that year. But even as late as June 1939 the Luftwaffe General Staff still refused to approve the plane for tactical air reconnaissance purposes, even though it met most of the requirements of the inspectorate, although it was much slower than desired./ The inspectorate finally did succeed in having the FW-189 introduced, as the successor of the Hs-126, but much time had been lost in the meanwhile.[1] Indeed, as late as the beginning of the Russian campaign in 1941, only a limited number of the 189's had been placed in service in the tactical reconnaissance squadrons.

The new plane was a considerable improvement over the older types. While its two engines gave it a much greater safety factor, it could also carry an additional crew member, as a rear gunner. This not only relieved the observer of this function, but provided constant

---

* Editor's Note: Technical data in unpublished appendices, USAF Historical Study No. 163. Karlsruhe Document Collection.

/ Instead, the Luftwaffe General Staff desired to introduce a three-seater model--but with only one engine--which the inspectorate had rejected. Apart from its other weaknesses this plane was unsymmetrical, in that its engine was mounted in one of the wings, which therefore had to be larger than the other. This also had the effect of almost completely obscuring vision for the crew members on that side.

observation of the most threatened quarter. The observer's seat was next to the pilot, which made for a better understanding between the two. The closed cabin afforded protection and more freedom of movement for the crew. It was so arranged that the pilot and the observer had a clear forward field of vision, thus permitting good photographic work, since the plane could be steered to point targets. Its limited capability in blind flying could become a full capability by the addition of a radio operator with appropriate radio equipment.

Of all aircraft models used hitherto by the Luftwaffe for tactical reconnaissance missions, the FW-189 was the closest approach to the ideal. It was superior to all former models in construction, flight safety, facilities for crew cooperation, armament, equipment, and operating range. One important disadvantage was that it was not faster than the Hs-126. Throughout the pre-war period and during the war the Luftwaffe at no time was able to produce engines with a thrust equalling those produced in foreign countries, and this was the reason for the failure to increase the speed of the FW-189. During 1941 and 1942 the plane was thought suitable in every respect for close-range and battle reconnaissance missions. From 1942 on, however, when Russian fighter defenses began to improve, it no longer met requirements because of its low speed. However, it was used with success in night reconnaissance up to the end of the war.

The question presents itself whether it was a wise measure to incorporate the three separate missions of tactical, battle, and artillery reconnaissance for execution with one and the same type of aircraft, since these missions in some points varied widely one from the other. For tactical purposes, the plane had very much the same types of missions to execute as any strategic reconnaissance unit. Therefore, each air reconnaissance squadron should have been given a certain percentage of twin-engine aircraft of the strategic reconnaissance type. This percentage could have been up to 50 percent. A plane of this type would not only have been more suitable for the execution of normal tactical missions, but at the same time would have been able to execute longer range missions for the artillery.

Battle reconnaissance would have required an armor protected plane, which probably could also have served as a ground-attack plane. A plane of this type no doubt also could have handled close range missions for the artillery. Technologically, the development

of an armor-plated battle reconnaissance plane would have been possible, since the German Army Air Forces at the end of World War I in 1918 had two such models, one from the firm of Junkers and one from the Allgemeine Elektrizitaets Gesellschaft, both of them known as the "Infantry Plane" and both protected by armor plating from ground fire.

There is also the possibility that a helicopter could have performed the missions of close range artillery reconnaissance even better than a plane, and the artillery arm had repeatedly requested the Luftwaffe prior to the war to furnish helicopters to replace the stationary observation balloons in use. However, the Luftwaffe High Command refused to introduce helicopters as artillery planes, although a suitable model (Focke) was available for the purpose before the war.

The artillery arm also requested introduction of the Fieseler-156 (Storch) liaison plane, to be used in the artillery as a forward observer plane for reconnaissance and fire directing missions. However, the Inspector of Air Reconnaissance Forces refused to approve this request, stating as his reason that so slow a plane could not be employed without fighter protection and that no fighters would be available for this purpose. The number of Fieseler Storch planes lost in front areas while on liaison missions during the war proved how justifiable this view had been.

Finally, the question arises why consideration was not given at an earlier juncture to the use of single-seater fighter aircraft for reconnaissance missions. This suggestion was first made to the Inspector of Air Reconnaissance Forces at the turn of the year 1939-40 by the appropriate staff officer of the Luftwaffe Operations Staff. The inspector considered that fighter aircraft would be suitable only for tactical air reconnaissance photography missions and not for missions as a normal tactical battle reconnaissance unit or for artillery reconnaissance missions.

However, since stronger engines were not available for the FW-189, and since faulty political and military trains of thought had prevented the development of new types of more suitable aircraft, it became necessary to adopt fighter aircraft as an expedient. To this end fighters available at the time received appropriate equipment and were used for tactical reconnaissance purposes. These were

THIS PAGE DECLASSIFIED IAW EO12958

the Messerschmitt 109-G (Me-109) and Focke-Wulf 190-A-6 (FW-190) types.*

It was thought that, for the time being at least, the disadvantage could be accepted of not having slower aircraft carrying an observer for the execution of special type reconnaissance missions. Developments in foreign countries also seemed to show that the use of fighter aircraft for reconnaissance was at the time the only possible course to be taken. It is only natural that the fighter-reconnaissance type of plane was far superior to any type of multi-seater reconnaissance type of tactical reconnaissance aircraft in speed, climbing ability and versatility. Whereas the multi-seater reconnaissance plane was forced to do everything possible to avoid combat against fighter aircraft, the fighter-reconnaissance plane was able to defend itself, particularly when operating as part of a pair or flight, even against a numerically superior enemy fighter force. Owing to its speed and maneuverability it was also better able to escape antiaircraft ground fire than the normal type reconnaissance plane. Finally, its diving capability enabled it to descent swiftly to detect details and then climb back rapidly to a high altitude.

But the fighter-reconnaissance plane also had distinct disadvantages. For one thing, the pilot had to act simultaneously as observer, a function he could not perform to full satisfaction in addition to the task of piloting his plane. Thus, a reconnaissance fighter could carry out road reconnaissance at high or low altitudes, but could hardly be used to carry out point reconnaissance missions in the open terrain, such as the precise detection of a battery position. Artillery fire observation was also a difficult mission; it was impossible to observe accurately the general placing of artillery fire without having an observer along for the purpose. Vertical air photography, including panorama photos taken with an automatic camera could be carried out with a single-seater plane, but it was impossible to take oblique photos, such as are necessary in battle reconnaissance by air.† The photographic coverage of large areas,

---

* Editor's Note: Technical data in unpublished appendices, USAF Historical Study No. 163. Karlsruhe Document Collection.

† Editor's Note: The inability of Luftwaffe single-seater aircraft to take oblique photographs is explained by the fact that the only

as required for cartographic purposes, for example, and in which the lateral overlapping of the separate film strips has to be rigidly observed, was also a mission which the single-seater plane pilot could hardly be expected to execute. Such missions had to be assigned to long-range reconnaissance units.

For bad weather and night missions the reconnaissance fighter was just as suitable as any other fighter type of aircraft, which means that its usefulness was restricted. At night or under conditions of poor visibility, the pilot was forced to concentrate his attention on flying the plane, thus greatly lessening or even eliminating tactical observations.

On the whole, the use of single-seater aircraft for tactical reconnaissance proved a practicable measure. Indeed, under the proper conditions and within the scope of its capabilities the fighter plane was used for such purposes with success.

Strategic Reconnaissance Units for the Army. At the opening of the Polish campaign the Luftwaffe assigned to the Army ten long-range or strategic air reconnaissance squadrons. During the 1940 campaign in France, the Army still had the same number of long-range air reconnaissance squadrons. By the opening of the Russian campaign in 1941 three night reconnaissance squadrons were also assigned to the Army, which thus then had a total of thirteen long-range

---

available oblique-purpose camera, according to Allied intelligence, was a hand-held, hand-operated instrument with a 12.5-cm. lens and with the official designation of RB 12.5/9x7. This limitation naturally obviated the possibility of a fighter pilot's taking oblique shots. Indeed, American and British development of aerial photography was considerably in advance of the German, for the Luftwaffe had developed no new camera up to the middle of 1944. Air Intelligence Summary, USSAFE, No. 27, 14 May 1944, p. 5. USAF Historical Archives. The USAF, for example, developed an oblique-purpose camera which, at least as early as January 1944, had been installed on the P-51. Ltr., Hq Ninth Air Force to CG, USSAFE, subj: Photographic Survey of the Ninth Air Force, 24 January 1944. USAF Historical Archives, 519.626, 1944-48.

or strategic air reconnaissance squadrons. This figure obtained for the remainder of 1941. Since long-range air reconnaissance for the Army became a mission of the Luftwaffe in the spring of 1942, these squadrons were directly assigned to the Luftwaffe during that year. In the period 1942-1944, the number of squadrons, on a monthly average, was 23 in 1942, 27 plus in 1943, and 28 plus in 1944, with an appreciable drop in the latter part of that year, down to 15 squadrons in April 1945.* Whereas it was possible during the Polish and French campaigns to assign each army group and each army participating one long-range reconnaissance squadron, this was no longer the case in the Russian campaign.

Initially, beginning with 1 July 1934, long-range reconnaissance squadrons were equipped with Type He-45 aircraft. In the following year, in view of the inadequacies of the He-45, each long-range reconnaissance squadron was assigned three He-70 aircraft/ on the recommendation of the Inspectorate of Air Reconnaissance Forces. The He-70 was a fast single-engine plane known generally as the "Blitz," which had been developed by the German Lufthansa Airlines for the transportation of mail. Its great speed was due primarily to its favorable aerodynamic design. Weapons and other military equipment were then installed with the object of making the plane usable for long-range reconnaissance. But in spite of its advantage of speed over the He-45, the He-70 proved of only limited value for long-range reconnaissance purposes because of the poor field of vision from the observer's seat. Also the model adapted for the purpose was 18 miles slower than the original model because of the weapons installed and because of the coat of camouflage painting it had been given.

For this reason Do-17-P// planes were used from 1937 on to equip the long-range reconnaissance squadrons allocated to the Army. The first twin-engine model assigned to the long-range squadrons, the Do-17-P was designed originally as a dual-purpose plane, to be used as a light bomber or twin-engine fighter. It rendered excellent service as a long-range reconnaissance plane in the Polish and French

---

* Editor's Note: Statistics showing monthly figures are available in the original manuscript and the translated draft of USAF Historical Study No. 163. Karlsruhe Document Collection.

/ Editor's Note: Technical data in unpublished appendices, USAF Historical Study No. 163. Karlsruhe Document Collection.

// Editor's Note: Technical data in unpublished appendices, USAF Historical Study No. 163. Karlsruhe Document Collection.

campaigns.

Up to the end of the war the Ju-88* was also used as a long-range reconnaissance plane, the only difference being that its engines were improved. It rendered excellent service in this field, although its losses were heavy--as will always be true in operations involving penetrations by individual aircraft into the far rear of enemy areas heavily defended by fighters. At the beginning of the Russian campaign the He-111† aircraft was used temporarily in the reconnaissance squadrons assigned to armored groups.

In efforts to avert the loss of strategic reconnaissance aircraft and to create the possibility of air reconnaissance over strongly defended hostile areas, such as Britain, several varieties of Arado 234 twin-jet planes were placed in service for such missions towards the end of the war.

Night Reconnaissance Units. On the initiative of the Luftwaffe General with the German Army High Command three night reconnaissance squadrons were organized for the campaign in Russia, each of them equipped with nine aircraft (Do-17Z) suitable for blind navigation. The number of these squadrons remained fairly stable, rising to four in August 1942. From June 1944 to April 1945 the number was constant at three squadrons.†† The squadron's planes were given equipment to drop parachute flares and flashlight bombs for night photography. Although the aircraft initially employed proved highly satisfactory, they were later replaced by an improved model, the Do-217.

---

* Editor's Note: Standard twin-engine day or night bomber. Technical data in unpublished appendices, USAF Historical Study No. 163. Karlsruhe Document Collection.

† Editor's Note: Twin-engine heavy bomber. Technical data in unpublished appendices, USAF Historical Study No. 163. Karlsruhe Document Collection.

†† Editor's Note: Statistics showing monthly figures are available in the original manuscript and the translated draft of USAF Historical Study No. 163. Karlsruhe Document Collection.

Units for Temporary Assignment in Army Support Missions

Fighter Units. The 1935 edition of Air Field Manual No. 16 still adhered to army command of fighters, in paragraphs 130 and 131: "Fighter and antiaircraft artillery forces committed in defense missions within operational zones of the Army will as a rule be assigned under Army command." In those times the operational zones of the Army were considered as those areas in which it was essential for the Army to have unrestricted command authority in all fields of endeavor, military, administrative, and political (executive authority), in order to be able to conduct its combat operations successfully. It was thought, therefore, that the Army should also have responsibility for the air defense mission in such areas and should have control over the necessary means for this purpose.

Experience gained later in war games, maneuvers, and on other occasions led to the realization that, given the existence of a separate and independent air force, it was no longer possible to maintain the principle of sole responsibility of the Army in such areas. Large elements of the Luftwaffe units would be stationed in such areas, together with all their signal communications and supply and servicing installations. Very often such areas also contained factories and installations of vital importance for the armament industry and for the military effort in general, but the defense of which was not of direct concern of the Army, a mission for which the Luftwaffe was in general responsible. If the Luftwaffe were to commit its forces in the execution of defense missions in these areas, it was not feasible to place these forces under Army command. They had to remain under Luftwaffe control to insure swift shifts in the main effort of defense caused by enemy attack action.

The defense of areas with such a wide frontage in the forward areas of combat also could not be handled by fighter and antiaircraft artillery forces alone. Effective defense here was possible only through continuous destructive attacks by bomber forces against the enemy air forces on the ground. Bomber forces for missions of this type required fighter escorts when crossing the front line areas. On the other hand, when enemy air forces endeavored to cross the operational zone of the Army with the intention of attacking targets farther in the rear, and thus were outside the Army's operational zone, it was necessary for friendly fighter forces to intercept and

attack them continuously before they could cross the front areas.

The circumstances just described would result automatically in the development of heavy concentrations of fighter forces within the Army zones of operations, only some of which would be intended for missions in protection of Army forces or for other Army support purposes. To have placed them under command authority by Army headquarters would have resulted in continuous controversies between the Army and Luftwaffe commands over the sequence and priorities of air missions and would have made uniform direction of operations impossible.

Another point recognized at an early stage was that the mission of air defense commenced at the factories in which aircraft were manufactured and extended throughout the length and breadth of the friendly zone of interior; that it had to be considered as an homogeneous whole, and could not be divided up between the Army, the Navy, and the Luftwaffe. Air Field Manual No. 16, in paragraph 24, stated quite correctly that, "Attack, defense, and local protection are reciprocal missions. They must be directed by one center in accordance with uniform principles." For this reason a supplementary sheet to Air Field Manual No. 16 published prior to the war established in paragraph 121 that fighter forces would only be assigned to Army command "when the situation on the ground made this necessary and the overall situation permitted." This doctrinal statement was supplemented in paragraph 121:

> Fighter units of the Commander in Chief of the Luftwaffe stationed within the Army zones of operations or near such zones for purposes of operational air warfare can, under instructions from the Commander in Chief of the Luftwaffe and in agreement with the locally responsible commands of the Army, be employed in operations to protect the zone of operations against air attack or to prevent enemy air action over the zones.

The above formulation was arrived at only after serious disputes with the Army and represented only a compromise solution. It served to confirm the view that under given circumstances, fighter units after all would be assigned under Army control.

In actual fact no fighter forces were assigned under Army command throughout World War II. Instead, the Luftwaffe was assigned responsibility for the execution of the following missions for the Army: 1) Air defense within the Army zones of operations; 2) action to achieve control of the air over front areas, above all to safeguard reconnaissance units in the air in the execution of their missions; 3) fighter action in support of combat action on the ground under certain circumstances.

In the light of experience gained in World War I the Luftwaffe attached great importance to the ability of its fighter forces to participate in combat on the ground in appropriate circumstances. When employed in such missions they were able to participate not only with their aircraft gunfire but also with bombs. For this reason the fighter models used in the first years of World War II were so constructed that bomb clips could be attached under their wings, thus enabling them to carry bombs. Since these clips reduced speeds by approximately 24 miles, they were attached only when required.

Tactical or Close-Range Bombers. Up to 1938 the Luftwaffe High Command had no front line special air units available for commitment in missions in direct support of the Army. The only force of this type in existence at the time was organic to the training wing. It was an experimental group, equipped with Henschel-123 (Hs-123)* planes, and known as a ground-attack group (Schlachtfliegergruppe). With a strength of forty aircraft, it was organized in three 12-aircraft squadrons plus a headquarters flight. It was not clear at the time whether the fact that 38 ground-attack squadrons, with an authorized strength of 228 aircraft, had been considered necessary towards the close of World War I had been due to the conditions of position or static warfare. It was hoped that this type of warfare could be averted in the future through the use of modern means of warfare, such as tank and air forces. Consequently, it was thought that the best way to support army operations would be through indirect support, through air attacks in the rear areas of combat and against the hostile armament industries. If the occasion arose, it was envisioned that the air forces intended for operations

* Editor's Note: Single-engine, single-seat assault or ground attack fighter.

of this type, which would be a part of the operational air forces, could also be committed temporarily at any time in the battle area.

However, controversy over the above point was by no means over. Decisions had been postponed until after the build up of the operational air arm was completed and until more experience could be gained with the existing experimental ground attack group. Experience in the Spanish Civil War, where out-dated fighter types, no longer suitable for missions of this type because of their inadequate technical capabilities, had been used with decisive results to participate in ground combat brought the whole problem into the foreground.

Prior to German occupation of Sudetenland in 1938, when the possibility of armed conflict had to be taken into consideration, orders were therefore issued for the immediate activation of five so-called ground-attack groups to be numbered 10, 20, 30, 40, and 50. The 10th and 50th Groups received Hs-123 aircraft, each of the other three groups received Arado-68 (Ar-68),* He-46, and He-51/ aircraft. Starting in November 1938 four of these five groups became dive-bomber groups when they were reequipped with Type-Ju87 dive-bomber aircraft. Only one remained in existence as a specific ground-attack unit, equipped with Hs-123 aircraft. When war broke out in 1939 two special types of air units were thus available for commitment in direct support of army operations, i.e., ground-attack units and dive-bomber forces.

In the case of the ground-attack units, the situation remained unchanged in the first years of warfare, with only the experimental unit of the former training wing in existence. It was only from 1943 on that first steps were taken to activate more ground-attack units, raising the total to five by September.

It gradually became evident that the dive-bomber units were no longer suitable for action with their out-dated aircraft. Consequently, beginning in October 1943, the existing dive-bomber groups were

---

* Editor's Note: A single-engine biplane, designed primarily as a training plane.

/ Editor's Note: A single-engine biplane, designed primarily as a training plane.

reorganized as ground-attack groups and reequipped with FW-190 aircraft. This action raised the number of ground-attack groups from 5 to 14 in October, with a high of over 24 by December 1943. The monthly average in 1944 was 20-plus groups, while the figure for April 1945 was 17.*

Although frequently committed in independent air force operations, such as attacks against airfields as part of the battle for air superiority, up to October 1943 the dive-bomber forces remained the main air arm for missions in direct support of army operations on the field of battle. The average monthly number of groups varied from approximately 11 for 1940 and 1941 to 7 for 1942 and 12 through September 1943.†

Special Type Aircraft for Ground-Attack and Dive-Bomber Forces. In response to invitations from American aero clubs, Ernst Udet†† in 1934 had traveled to America to participate in aviation championship contests. There he had come to know the Curtiss Helldiver, developed by the United States Navy as a ship-carried fighter plane and also equipped for operations as a fighter-bomber against ships. Udet was greatly impressed by the demonstrations of the plane in dive-flight and the release of bombs at very low altitudes, and obtained from the German Ministry for Aviation permission and funds to purchase two planes of this model for Germany.

The planes thus purchased served as models for the development of German versions of dive-bomber aircraft, a development which was destined to meet considerable opposition and difficulties.[2] In his memoirs, Heinkel for example states:

---

* Editor's Note: Statistics showing monthly figures are available in the original manuscript and the translated draft of USAF Historical Study No. 163. Karlsruhe Document Collection.

† Editor's Note: Statistics showing monthly figures are available in the original manuscript and the translated draft of USAF Historical Study No. 163. Karlsruhe Document Collection.

†† Editor's Note: General (Generaloberst) Ernst Udet, famous German fighter pilot in World War I, became Chief of the Technical Office of the Luftwaffe in 1936, and later Chief of Procurement and Supply. He committed suicide on 17 November 1941.

American firms, above all the firm of Curtiss, had been producing dive-bombers already for a number of years. Over there they had given these planes the highly descriptive designation of "Helldiver" because of the extraordinary strains dive-flight imposed on the pilot. In 1932 I had produced a dive-bomber, the He-50 for Japan. . . . A series of these planes had been constructed in 1933 and 1934 for the Luftwaffe, for the experimental equipment of one dive-bomber squadron.

However, when /Wolfram Freiherr/ von Richthofen, later Field Marshal von Richthofen, in 1934 took over the Development Branch of the Technical Office the idea of a dive-bomber was killed. Richthofen had stated categorically: "Diving to a level below 6,600 feet is complete nonsense." Owing to the high stage of development reached in antiaircraft artillery, he maintained, every plane which risked a descent to such low altitudes would become a victim of antiaircraft fire . . . .

A few engineers in Richthofen's branch who did not agree with their chief in this matter had admittedly continued to make experiments in this direction. Thus, they had on their own responsibility carried out tests with the Henschel Hs-123, a double decker originally designed as a single-seater fighter plane. Richthofen nevertheless remained skeptical. It therefore appeared all the more surprising when now, in 1936, a large-scale contract was suddenly awarded for the development of dive-bomber aircraft.

The influence behind this volte-face centered around the figure of the famous German aviator, Udet. If Udet's appointment as successor to Richthofen as Chief of the Development Branch was the source of considerable surprise, even more so was his promotion soon after (10 June 1936) as chief of the entire Technical Office. But of course so fateful a change, for both Udet and the Luftwaffe, was not foreseen at the time.*

* Editor's Note: For Udet's unfortunate influence on the development of the Luftwaffe, see Richard Suchenwirth, Historical Turning Points in the German Air Force War Effort, USAF Historical Study No. 189, pp. 7-8.

This is one of those rare cases in which the officer, that is von Richthofen, who was destined later to achieve the most famous successes in the use of this weapon initially opposed its development.

The Hs-123 was thus developed from the American Curtiss Helldiver model. The new plane was an all-metal, semi-high-wing plane without stays, which proved suitable for dive-bombing and for ground attack. The lower wing had only one one-piece rib, while the upper wing had two two-piece ribs supported by canopy struts. The ailerons were on the upper wing, the landing flaps on the lower, and the stabilizer was supported against the fuselage. Both the stabilizer and ailerons had disconnecting flaps which could be adjusted while in flight, while the undercarriage was in two cowled halves built in. The air-cooled engine was covered by a NACA hood.*

The first five of these planes were tried out in the Spanish Civil War in 1937. However, the Hs-123 played no important role, since it was soon replaced by the Ju-87, a Junkers dive bomber with improved performance, the first test model of which was ready in 1935. In the development use was made of the experience gained with the former Ju-47 model. The Ju-87 thus had many similarities with the Ju-47, and was developed along the lines of a fighter plane. It was a relatively small, highly maneuverable plane of all-metal cantilever low wing monocoque construction. A particularly noticeable feature was the gull type wings, necessitated by the very compact undercarriage, providing a good field of vision forward and downward for the pilot, and insuring the most favorable airflow over the fuselage and the wing.

The fuselage and the power units had to be specially adapted to the enormous strains which would develop during dive flight, necessitating a large amount of detail work in the construction. The use of dive-flight brakes made it possible to keep the high centrifugal forces and the stress and strain on the fuselage, the power unit, and

---

* Editor's Note: The NACA cowling, of which the hood formed a component part, was developed by the United States National Advisory Committee for Aeronautics, and the report on its design was published in 1934.

the crew within tolerable limits. Plans to have a retractable undercarriage were abandoned in order not to weaken the wing junction. *

Later modifications, in particular the change-over to a new undercarriage, enabled the plane to carry 2,200-4,000 pounds of bombs, or made it possible to use the plane for dual purposes. / One important disadvantage of the dive-bomber was that it could not be employed when the cloud ceiling was lower than 2,600 feet, since the bombs could only be released in a relatively vertical dive. The manufacture of these aircraft ceased in October 1943.

When it became evident during the war that the Ju-87 was too slow to protect itself, the decision was taken after numerous tests to equip the ground-attack units with FW-190 planes, a fighter model, after various adaptations in the plane's equipment. Operational testing of this model as a ground-attack plane commenced early in 1942.

The FW-190 was a single-seater fighter plane powered by an air-cooled engine. This feature was considered a special advantage, since the plane could not be put out of action by hits in the cooling system. Its compact structure and advantageous distribution of weight gave the plane a high degree of maneuverability. Its machine guns and cannon gave it a very heavy fire power. Having a wide (retractable) undercarriage, the plane had excellent take off and landing capabilities, so that it could operate from field-type airstrips.

During the first years of warfare the dive-bomber forces proved adequate for combat action against enemy tanks. Soon after the beginning of the Russian campaign, however, the large numbers of tanks in action and the fact that tanks now had better protection against bombing made it necessary to seek new ways and means for antitank action.

After various experiments a number of special units were organized in 1943, the first being an experimental unit for tests in

---

* Editor's Note: Technical data in unpublished appendices, USAF Historical Study No. 163. Karlsruhe Document Collection.

/ Editor's Note: Presumably the author means that, with a greater bomb-carrying capacity, the aircraft could also be used in level bombing.

antitank action at Rechlin. This unit was later transferred to Bryansk on the Russian front in order to test its effectiveness in actual combat. It consisted of an antitank squadron of Ju-87 planes and the 92d Squadron with Ju-88 planes. In addition, an Antitank Air Command was established which had as components the 51st (Antitank) Fighter Squadron, organized in January 1943; the Experimental Antitank Squadron (Me-110 planes), organized in April 1943; and the 1st Twin-Engine (Antitank) Wing Squadron, established in June 1943.

However, this force was deactivated in July 1943 and its place was taken in October of the same year by the 4th Group, 9th Ground Attack Wing. The group contained the 13th and 14th squadrons of the wing, equipped with Focke-Wulf planes, each armed with two 30-mm cannon. Another four squadrons were soon added. Some units of the newly activated ground-attack wing also contained an antitank squadron.

The decision was taken in 1945 to establish a few provisional squadrons and equip them with recoilles type antitank weapons.

In 1942 one 37-mm gun was mounted under each wing of the Ju-87 dive-bomber aircraft of the Experimental Antitank Air Detachment at Rechlin. Plans provided for a special type of ammunition to be furnished for these guns, with a Wolfram core, and capable of piercing the strongest armor plating known at the time. The detonators were set to explode the charge only after the shell had pierced the armor, so as to achieve maximum effects inside the tank struck. Already a slow aircraft, the speed and maneuverability of the Ju-87 plane were still further reduced by these changes. However, the guns made it possible to aim accurately, with a margin of error of between 8 and 12 inches. [3]

Soon after the opening of the Russian campaign, the Russians commenced sending out small planes at night to harass German troops and headquarters staffs and deprive them of rest. Most of these planes were of the U-2 type,* carried only a few bombs, and penetrated to just behind the front lines.

As a countermeasure, the Germans in the autumn of 1942

---

* Called "sewing machines" by German soldiers.

began organizing a few squadrons as harassing squadrons. A start was made by the Fourth Air Fleet, which organized a few of these squadrons in the southern sector of the eastern front; the First Air Fleet followed later with the establishment of a group. Very soon the Luftwaffe High Command established these units as regular table of organization units. At the end of 1943 a number of groups were consolidated to form the 1st Night Ground-Attack Wing, and in 1944 twelve of these wings, numbered 1 through 12, were in existence. Of these wings the 1st, 2d, 4th, 8th, and 9th were equipped with Ju-87s, the 3d and 5th with older types of training and practice flight aircraft. The 7th Wing had Italian C/R 42 (Fiat) planes.* The 6th, 11th, and 12th wings, committed in Esthonia and Finland, each had only a small number of aircraft, while the 9th Night Ground-Attack Wing had only 9 aircraft in each squadron.

Initially the various squadrons were equipped with training and liaison types of aircraft, such as the Arado-66, Gotha-145, and Heinkel-4; even Fieseler-156 (Storch) planes were used for this purpose.

In Italy, the Luftwaffe's Second Air Fleet assigned CR-42 planes to its night harassing units, and at the time of the Allied landings at Anzio-Nettuno in February 1944, air fleet headquarters requested approval from the Commander in Chief of the Luftwaffe to use Ju-87 aircraft. This plane, hitherto used as a dive-bomber, was now no longer suitable for dive-bombing missions since it could not be committed during daylight because of strong Allied air defenses. Although the Chief of Ground-Attack Forces expressed grave doubts about the advisability of this measure, Ju-87 aircraft were assigned and achieved excellent results in night operations. This made it possible actually to damage the enemy instead of only harassing him.

Bomber Units of the Operational Air Forces Required to Cooperate When Necessary. The bomber units of the Luftwaffe were so equipped that, in addition to their other missions, they could execute missions in support of the ground forces. But their usefulness in such areas was subject to limitations, since the heavy

* Editor's Note: A single-seat fighter biplane with a radial air-cooled engine. Called the "Freccia" ("Arrow").

antiaircraft fire encountered in battle areas made it impossible for the units' large twin-engine aircraft to operate at low enough levels to search out appropriate targets. For this reason their real targets were outside of the enemy battle zone. Concerning their use, Air Field Manual No. 16 stated in paragraph 21:

> In close cooperation with the ground forces and the Navy, air forces, and particularly the bomber units, frequently will be unable to find targets against which they could bring their full striking power to bear and through the destruction of which they could effectively support the Army or the Navy.
>
> It is sounder practice to commit these air forces against distant targets, the destruction or neutralization of which can exercise a decisive influence on the combat operations of the Army or the Navy.
>
> Thus, action against the sources of the enemy military potential might also be advisable even during times of close cooperation with the Army and the Navy . . . .

From the above it is obvious that only a part of the bomber forces was intended for missions in support of Army operations at any given time.

The Luftwaffe began the war in 1939 with a total of 31 bomber groups (of 3 squadrons each), including the so-called fast bomber groups. By the following September the total had risen to 45, which remained the approximate figure at the beginning of the Russian campaign in June 1941. Three more groups were added for the remainder of 1941, but the total dropped to an average of 35 groups for the first four months of 1942, rising to a high of almost 47 groups in September. The year 1943 saw the highest total, with a monthly average of 54-plus groups. The monthly average in 1944 was 41-plus, with a sharp decrease toward the end of the year. And by April 1945 the number of operational bomber groups had shrunk to 7-plus.*

---

* Editor's Note: Statistics showing monthly figures are available in the original manuscript and the translated draft of USAF Historical Study No. 163. Karlsruhe Document Collection.

The German Air Forces had three types of medium bomber aircraft:

a. Dornier 17, known as the Do-17. At the beginning of the war Model Z (a twin-engine monoplane) of this type was in use in front line units. Owing to its great speed* it was particularly suitable for low-level attacks, for which reason these aircraft were assigned primarily to units of the VIII (Close-Support) Air Corps. In 1942 this model was replaced by the Do-217.

b. Heinkel 111, known as the He-111. Model He-111-HP, a twin-engine heavy bomber, was in use at the beginning of the war, and with certain modifications remained in use right up to the end.

c. Junkers 88, known as the Ju-88. This type was intended as standard equipment for the Luftwaffe. It was introduced in three variants:

(1) With a flight capability of 900 miles carrying a normal bomb load of 3, 300 pounds. If the disadvantage of longer runway requirements for the take-off were accepted, the plane could carry a load of 6, 800 pounds in bombs.

(2) With a flight capability of 1, 440 miles carrying a normal bomb load of 1, 100 pounds. If overloaded, the plane could carry a bomb load up to 3, 300 pounds.

(3) With a flight capability of 1, 600 miles with a bomb load of 1, 100 pounds.

The plane carried a crew of four, consisting of a pilot-commander; a bombardier-observer-copilot; a radio operator, who was also the rearward and upward gunner; and a forward gunner, who was also responsible for downward fire. All crew members were seated in one compartment and had good facilities for intercommunication. The plane had all equipment for oblique and dive attacks which had proved sound in the Ju-87 dive-bomber model.

---

* Editor's Note: Maximum speed at 16, 000 feet was 275 m. p. h.

Of the 40 bomber groups in existence on 12 February 1940 24 were equipped with He-111s, 12 with Do-17s, 3 with Ju-88s (just being introduced at the time), and 1 with FW (Focke Wulf)-200, * equipped only for operations at sea.

Organization: the Key to the Mobility of Bomber Forces. The units were not organically tied to any ground service organization units. They could be serviced and maintained by any airfield operating company anywhere. Two airfield operating companies were provided for every bomber group in existence. This made it possible, if the situation required, to move airfield operating companies in advance from one area or theater of operations to another. The only provision made to orient newly assigned airfield operating companies on any special features of specific aircraft or its engines was that in every group each aircraft had one member responsible for the servicing, while each squadron had an aircraft sergeant, a radio, a weapons, and a bomb servicing supervisor. These latter personnel were carried along in the squadron transport plane.

The permanent local authorities, such as the local air base command, air base area command, or Luftwaffe Administrative Area Command Headquarters were responsible for such matters as the messing, billeting, and supplies (fuel, ammunition, etc.) of any units operating from their areas, so that a unit transferred to any airfield found everything present which it required. This "lodger" type system, in which each tactical airfield operated independently of any parent unit, made it possible for any unit to move from one airfield or theater of operations to another as fast as it could travel under its own speed in the air for immediate commitment in its new area of operations. /

Unlike the bomber units, reconnaissance and ground-attack units were dependent in their operations on their organic motorized ground service elements. However, they took along advance parties when moving to a new area, so that they were able to operate

---

* Editor's Note: Probably the FW-200K, a four-engined monoplane used for long-range oversea reconnaissance, mine-laying and convoy attack.

/ Editor's Note: From time to time the USAF has experimented with similar systems.

temporarily with these servicing parties until their regular ground components arrived. The tactical reconnaissance units had adequate surface motorized transportation and personnel to enable them to establish and maintain a forward battle or tactical airfield besides their base airfield.

Development and Procurement of Munitions for Ground Support*

Fragmentation Bombs. Even before World War II it was understood that the available SC-10 22-pound and SD-50 110-pound fragmentation bombs could be used with good results against large area live targets comprising closely massed personnel, such as troop assemblies or moving columns.

In view of the stated requirement of the Army for direct support, however, it was to be expected that air action would also be called for against dispersed infantry or other scattered targets, and in frequent cases even against dug-in targets. / A special type of ground-attack bomb, the SD-2 4.4-pound fragmentation bomb was developed specifically for such purposes, to be used by ground-attack aircraft against such targets. As a rule these bombs were to be dropped in large numbers by planes flying at a low altitude, the purpose being to cover large areas rather than to strike individual targets. The bombs therefore required no stabilizing fins and so were constructed in ball shape.

On the basis of experience in the Polish campaign and in the campaign in the west, in 1940, the decision was taken at the beginning of the Russian campaign to have other air units, such as fighter, dive-bomber, and bomber use these bombs. It was found necessary, however, to provide the planes used for this purpose with special bomb ejectors.

---

* Editor's Note: The German Air Force system of weapons selection is the subject of a monograph (as yet unpublished) by the present author, in the GAF Monograph Project.

/ Editor's Note: Details of bomb types used in Army support missions in Appendix No. 39 in unpublished appendices, USAF Historical Study No. 163. Karlsruhe Document Collection.

According to a report of 17 May 1941 from the Chief of Special Supplies and Procurement Services (Generalluftzeugmeister)[4] certain twin-engine bomber units (5 Ju-88 groups and 3 Do-17 groups) had such special equipment for the use of these bombs, and each of these planes could carry 360 Type SD-2 fragmentation bombs. Among single-engine fighter and dive-bomber units, seven groups (4 Me-109 and 3 Ju-87) were so equipped, and each plane could carry 96 Type SD-2 bombs. Plans for July 1941 (after the Russian campaign had been launched) provided for measures to equip another two groups, twin-engine fighter units, for the use of these bombs, each plane to carry 96 bombs.

As long as fronts remained fluid, these bombs proved highly effective although unfortunately in short supply. But once the ground situation became stabilized, it was found that the antiaircraft defenses were too effective for low-altitude operations, which were the prerequisite for this type of bombing, which from then on could be carried out by single-engine aircraft only on a limited scale and by multiple-engine aircraft not at all. It was only in the very last stages of the war, in the general state of extreme emergency when the fronts in the east had practically ceased to exist as continuous lines, that the bombs again came into use on an appreciable scale.

Development of Small Bombs for High Altitude Bombing. It became evident at a very early stage that the fact that the SD-2 fragmentation bombs could only be used in low-altitude operations was a serious disadvantage.

It is astonishing that the German command failed to realize the importance of very small bombs, to be scattered in very large numbers on targets. In the 1940 campaign in France the Luftwaffe had captured over one million of these 2.2-pound (1 kilogram) bombs to be delivered on targets in large drop containers. A special detonator caused the containers to open at a certain altitude above the ground and scattered the small bombs in a fairly regular pattern in the terrain. The bombs captured in France could have been used without any difficulty with the German bomb containers used for electron incendiary bombs, which were available in adequate quantities and which fitted into the German bomb clips. Without consulting the field forces, the Luftwaffe General Staff released the captured bombs for use as scrap material, the idea being to salvage the small

quantities of copper used in the detonators, since copper supplies were so very short in Germany. Too late, the importance of these bombs for use against live and dug-in targets was realized, and only then did production begin in Germany.

No information is available as to precisely when the idea (which was quite logical) was conceived to use these new bombs against live targets. That the necessity had not been realized sooner to develop very small bombs for use with special equipment, such as containers, in order to be able to attack effectively large areas by placing bombs at short intervals, is due to the fact that the Luftwaffe for a long time adhered to the idea that its real targets were not to be found within the battle area on the ground. On the contrary, it was felt that the logical targets for air attack to produce really effective results were the sources of hostile military power to be found within the interior of an enemy country, and this view was quite sound. The weakness of the German Army and faulty decisions by the German Command were what compelled the Luftwaffe in a steadily growing measure to attack ground targets within the battle area.

The SD-1 (2.2 pound) fragmentation bomb proved particularly effective after a new container (AB-250) to hold 225 of them was put into use. This container had the shape of a bomb and, similarly to a bomb could be aimed from the delivering aircraft. The container was opened by a detonator which could be set to explode at the desired height above the ground, from which point the bombs scattered over the target area below. In this way a large area could be covered completely and the small bombs even found their way into foxholes and similar shelter lacking overhead protection. They were therefore extremely effective against live targets.*

In 1943 the present author commanded the 1st Air Division in the central area of the eastern theater. On one occasion units of the division used these bombs in an attack against a wooded section in which massed Russian troops were assembled for a jump-off in an attack on the ground. After the air attack German troops were able to enter the wooded section without encountering any resistance at

---

* Editor's Note: There is little doubt but that this is the German bomb after which was modeled the American "butterfly" bomb.

all,, to find what could in the truest sense have been called a "dead man's wood."

In spite of all efforts by the responsible authorities, it was unfortunately not always possible later in the war to have these bombs and the containers available in anything like sufficient numbers.

In the 9 February 1943 Special Supplies and Procurement Services conference, Field Marshal Erhard Milch had the following to say on the subject of the production and tactical significance of this type of bomb:[5]

> At the front there is a badly felt need for 2.2-pound (1 kilogram) bombs. . . . What targets are to be found which make operations more than profitable? In their rear areas the Russians are moving forward in gigantic columns. They are marching in three columns abreast, with horses, horse-drawn columns, and vehicles in three columns, three vehicles abreast. The infantry are advancing in cross-terrain marches, widely dispersed in groups of 10, 20 or 40. Nothing effective could be done here with large bombs. If the small bombs were available it would be possible to rain these down on them.
>
> Once the snow is off the ground, and the cover is already very thin, enormous results could naturally be achieved with the 2.2-pound bombs, above all if operational missions were flown more frequently by the Luftwaffe than is presently the case.
>
> In contrast with the 2.2-pound bomb the 110-pound (50 kilogram) bomb is only useful when the intention is to destroy tanks, guns, shelters, or similar targets. In such cases the heavier types of bombs, from 110-pounds (50 kilograms) upward, are essential. Against these massed targets, which are to be found in large numbers and the destruction of which would have a decisive influence on the outcome of the war, it is necessary, however, to have the 2.2-pound bomb.
>
> If I can strike these people with these small bombs that would be a gigantic achievement. All through the summer

the Russians will want to do nothing else but attack. Either they will march forwards and attack, or we can attack and they will march rearwards. In either case I must be there with the small bombs, which will decimate them and break their morale.

The Fourth Air Fleet and General (Generaloberst) von Richthofen have reported that they have requisitioned and received nothing, that they would be able to deliver on targets the entire production of 350,000 of these bombs on one single day. This output thus appears far too small. Another point is that we have no supplies of these bombs stockpiled in outside depots, so that they cannot be made available for use in various front areas.

It was found very frequently, however, that the responsible German field commanders failed to realize the great value of these bombs for action against live targets.

New Antitank Weapons. During the war against Russia antitank combat action developed into a problem of the first order. The significance of the problem can be realized when the fact is taken into consideration that, according to postwar reports, Russia's output in tanks during World War II reached a figure of 150,000 compared with Germany's production of only 25,000. In addition, Russia received another 13,303 tanks from deliveries by the Western Allies.

The German Army had nowhere near enough antitank weapons, for which reason the Luftwaffe had to provide support in this field. Owing to faulty measures by the German Command and because a large number of the Russian tank factories were located in areas beyond the range of German bombers, no measures were taken to destroy the factories and thereby reduce production. Instead, it became necessary laboriously to destroy the tanks under exceedingly heavy fire on the field of battle.

The Luftwaffe was not adequately prepared for a mission of this type, and appropriate weapons for attack had to be developed with all speed, For this purpose steps were taken to mount one 75-mm gun under the pilot cockpit of Ju-88 aircraft, and one 37-mm gun under each wing of the Ju-87 (dive-bomber) aircraft. The tests

carried out with the large caliber gun mounted on Ju-88 aircraft were discontinued, however, because no way could be found to surmount the difficulties encountered. In contrast, the Ju-87 with its 37-mm antiaircraft type guns in many cases produced excellent results, while the best average results were obtained with the twin-engine Henschel-129 (Hs-129) aircraft carrying 30-mm guns. In spite of all efforts, however, it was found impossible to make sizable air units available for antitank action until the newly introduced FW-190 rocket-armed ground attack plane made its appearance.

With the ever-increasing need for antitank air action, large-caliber high-explosive bombs (1,100 pounds) came into use as an emergency measure. The difficulty of hitting tanks operating in dispersed order was fully realized, for which reason the large caliber bomb was chosen with the object of putting tanks out of action even if only a near hit was scored. It was found, however, that the explosive pressure from such bombs could only incapacitate a tank if it exploded within roughly twelve feet of its target and immediately above the ground without penetrating the ground. Penetration into the ground would have channeled the blast upward instead of sidewards. In practice, near hits capable of putting a tank out of action proved a rare exception.

Experience soon showed that the chances of scoring a hit were better with a large number of smaller caliber bombs with a highly effective explosive charge, and as a result a special antitank bomb was introduced. Weighing only 8.8 pounds (4 kilograms) this bomb was designated SD-4-H1.* The use of the hollow charge principle in these bombs made it possible to achieve very good results against tanks, since they were able to pierce armor up to a thickness of 5 1/8 inches. In addition, they were constructed to have a fragmentation effect, so that they were also useful against infantry operating with tanks.

It was found best to use the bombs with bomb containers of 1,100 pounds (500 kilograms) size, with an opening at the point. Each container held 78 SD-4-H1 bombs, and when delivered in a dive-bombing attack the effect was that of shrapnel concentrated at

* Abbreviation for Hohlladung--hollow charge.

the target. The chances of achieving direct or near hits were far more favorable than in the case of the SC-500 bomb. Hits within a radius of 26.6 yards (24 meters) were still close enough to set fire to the tank's fuel or ammunition, against a radius of only 4.4 yards (4 meters) in the case of the SC-500 bomb.

The new type of bomb was carried chiefly by Ju-87 dive-bomber aircraft, and their use decreased considerably when aircraft not capable of dive bombing replaced the Ju-87 in early 1944 as a result of the growing inadequacies of the latter aircraft's flight capabilities.

Use of Bombs Against Permanent Fortifications. The types of bombs in use at the time proved adequately effective against the obsolete kinds of fortifications found in Poland, Belgium, and Holland but they were not adequately effective against modern fortification installations, such as those of the French Maginot Line or the Russian fortifications at Sevastopol on the Crimean Peninsula. General Plocher writes as follows on this subject:[6]

> The effects of even the heaviest caliber bombs (3,000-5,000 pounds, 1,400-2,500 kilograms) on permanent fortifications were not great enough to completely neutralize the installations, even in the case of direct hits. It was only attacks against batteries in open emplacements that had a really annihilating effect . . . .

The Type SH-250 hollow charge bomb was introduced with the intention of achieving more effective results against fortifications. A report, dated 8 January 1942, by the Chief of Special Supplies and Procurement Services gave an analysis of its effectiveness:[7] "Due to application of the hollow charge principle, the bombs when used against fortified works have a penetration of at least 10 feet (3 meters) in the case of concrete, and of almost twelve inches (300 millimeters) in the case of armor plating."

This type of bomb was introduced too late to be put to practical use, however, since no fortifications of the types for which it was intended came under attack after their introduction.

Traffic-Interdiction Bombs. At the beginning of the war an

adequate variety of bomb types was available for use against the types of targets involved. The only weak point was that in attacks against rail lines the bombs frequently bounced off the ground and detonated some distance away without destroying the rail tracks. This was particularly the case when the rail section under attack was on a raised embankment, where damage is usually of a more lasting nature than in the case of rail tracks in level terrain. In order to prevent bouncing, the bombs were provided with spurs,* which held the bomb in place when it struck the ground.

In 1941 the Chief of Special Supplies and Procurement Services arranged a series of tests with bombs against Russian railroads. His report of 29 October gave the results of the tests:[8]

> Demolitions and bombings were carried out on the Orscha-Lepel section of railroad. The results were as follows:
>
> S.C. 10 Bombs. These are unsuitable, since they damage the rails only if they hit in the immediate vicinity.
>
> S.C. 50 Nose-Spiked Bombs. These can render Russian rail tracks unusable if they detonate between the rails or within 5 feet (1.5 meters) on either side of the rails.
>
> The damage can be repaired by filling in the bomb crater and replacing the damaged ties and rails with sound ones, which can be accomplished in a realtively short time.
>
> SC-250 Nose-Spiked Bombs. These bombs can do far more lasting damage to Russian railroads than the S.C. 50 type nose-spiked bomb, even if they strike 10 feet (3 meters) farther away, this being the difference between the craters caused by the two types.
>
> Spike-nosed bombs should be dropped while the plane is

* Called the Dinort Stab after inventor, Dinort, who was later given general officer rank. Editor's Note: At war's end Brigadier General (Generalmajor) Dinort was Commander of the 3rd Flying School Division.

in a downward slope at an angle of between 10 and 15 percent from an altitude of about 165 feet (50 meters). In general, the bombs thus dropped will lodge themselves in the ground, although a very small percentage of them might still bounce off.

The report went on to state that, from November 1941 on, some 1,000 Type S. C. 50, 500 S. C. 250, and 500 S. C. 500 spike-nosed bombs would be available each month. Four S. C. 50 bombs could be carried by the Ju-87, two by the Me-109, and four by the Me-110. But the Me-110, when equipped with E. R. 4 or E. T. C-50 suspended bomb racks attached under the fuselage, could carry eight. As to the larger S. C. 250, models B and R of the Ju-87 could carry only one bomb, while model D could carry three. The Me-109 could carry one, the Me-110 and Do-217 two, and the Ju-88 four. And the load capacity of these planes was the same for the S. C. 500 spike-nosed bomb as for the S. C. 250.

Bombs for Attacking Inland Waterways. For use against stationary targets, such as canals, bridges, lock installations, ship-lifting and other port installations, warehouses, and wharves, the bombs designed for normal demolition purposes were available. Mines were frequently laid by aircraft to sink ships in large inland or other canals and waterways. Thus, Directive No. 45 issued by the Wehrmacht High Command on 23 July 1942 prescribed that "The lower reaches of the Volga River will be mined to interrupt shipping."

A few missions were also flown to lay mines in the Suez Canal.

Bombs for Road Interdiction. The various types of bombs in normal use were also available in attacks designed to destroy such targets as road embankments or road intersections.

During mobile operations it was found that troop movements could be seriously hampered by bombs so placed at the entrance or exit from built up areas that they caused houses to collapse and cover the road with debris. The bombs most frequently used for this purpose were the types generally used in attacks against cities, particulars on which are given in the following section. Throughout the war it was found that the destruction of man-made structures was one of the most effective ways of interdicting road traffic. However, the same

can be said of bombing designed to interdict rail or waterway traffic. Paragraph 166 of Air Field Manual No. 16 contained a passage on the significance of destroying large, important man-made structures "which will take a long time to restore to operability." However, this was not so much a problem of ammunition, adequate supplies of which were available, as a problem of direct hits, and thus a problem of the methods of attack and the bomb aiming devices used.

Action was even more difficult against emergency bridges of military construction, particularly pontoon bridges. Very often in such cases enemy smoke operations and ground defenses were such that it was impossible to achieve success in high-altitude or dive-bombing precision attacks.

The Commanding General, Sixth Air Fleet, for example, reported to the Commander in Chief of the Luftwaffe on 8 March 1945 that it was hardly possible for German aircraft to take direct combat action against the Russian bridges across the Oder River, because the Russians immediately placed the bridges under smoke concealment when the German aircraft were observed approaching. The air fleet therefore suggested using a special type of mine with a very small draft and known as the Wasserballon (water balloon) or other suitable floating demolition missiles designed for use in rivers, and special type weapons against these bridges.*

As early as 11 February 1945 the Commander in Chief of the Luftwaffe had already authorized the release of 200 spherical type drift mines from Army stocks to the Sixth Air Fleet for use against the bridges. Only one mission was flown with this type of mine (by the 7th Squadron, 4th Bomber Wing) and no records are available on the results achieved.

Owing to the urgently critical battle situation the decision was even taken to dispatch Mistel (Ju-268) composite aircraft on a mission against the bridges on the night of 14-15 April 1945. Even these aircraft achieved no noticeable results, for which reason the Chief of the Luftwaffe General Staff gave orders to commit the

---

* A document on the development of the Wasserballon is extant in report from the Sixth Air Force, 26 February 1945. Karlsruhe Document Collection, C VI 2.

remaining 38 Mistel aircraft against other targets.[9] It is thus evident that no suitable weapons were available to destroy the bridges involved.

To counter the German use of river type or other drift mines the enemy soon commenced the use of torpedo or other nets, placed up stream, to protect bridges. For this reason an effort was made in January 1945 to destroy by means of Wasserballon type mines the torpedo nets used by the enemy to protect the bridges at Nymegen, in Holland, against attack. However, this action failed because the boat dispatched for the purpose first came under a bombing attack and then was sunk by artillery fire.

Training of Luftwaffe Personnel for Army Support

Officer Training. The older generation of officer personnel assigned to higher level Luftwaffe command positions had in almost all cases been members of the Army establishment during the time when Germany had no air forces. Some had attended the army academy, where they had received training as Army General Staff Corps officers.

In the service schools of the Luftwaffe the younger generation of officer personnel received training in certain basic concepts of army tactics. In the Air Command and General Staff School (Luftkriegsakademie) newly established at Gatow in 1935, General Staff Corps candidates of the Luftwaffe were instructed by Army General Staff Corps officers in the subject of army tactics. Here, map maneuvers were conducted to demonstrate the tactics of army forces.

A small number of General Staff Corps and other officers were assigned to participate in courses known as the Reinhardt Course and lasting one year, where they were trained to serve as joint military command personnel (Wehrmachtgeneralstabsoffiziere) together with officers from the Army and Navy. Later this training was given at a Joint Command and General Staff School (Wehrmachtakademie). In these courses the subject of the problems of joint military operations was dealt with in the form of special studies. In addition, the Army and the Luftwaffe exchanged a certain number of senior officers as participants or observers at the command map

maneuvers conducted separately by the two branches each year for higher level command personnel.

Training of Flight Personnel. After receiving basic flight training, personnel were assigned to the Air Service Schools (Fliegerwaffenschulen) for theoretical and practical training in tactics. Here instructions continued on the subject of army support operations, and the participants took part in actual missions involving reconnaissance and the use of weapons against stimulated targets of all sorts. The types of such schools existing in the Luftwaffe were: air reconnaissance, fighter, dive-bomber, and heavy bomber (to train bomber crews).

Early in 1938 a new system started under which the army in a continuing process detached commissioned and appropriately gifted noncommissioned officer personnel to the Luftwaffe for training as air observers in the tactical reconnaissance squadrons.

Air Unit Training in Army Support. It is only natural that this subject was given particularly comprehensive treatment in the tactical air reconnaissance units, known as the Army air reconnaissance units (Aufklaerungsfliegerverbaende--Heer). To intensify this training the practice was adopted in 1936 of allocating these units to the appropriate Army commands (divisions, corps, etc.), to which they were to be assigned in case of war. These Army forces were authorized to include their allocated air reconnaissance squadrons in all maneuvers, and as a matter of principle the officers on the army command staffs and those of the air reconnaissance squadrons took part in each other's field exercises and map exercises.

During the initial stages of the Luftwaffe build-up the subject of cooperation with army forces was neglected. Air units participated, nevertheless, in the maneuvers and other exercises conducted by the Army, and this undoubtedly benefited training and cooperation on both sides. During small scale field exercises, particularly those conducted at the maneuvers areas, the Army also was authorized to request that the Luftwaffe should carry out exercise missions in order to afford the ground troops an opportunity to practice active and passive air defense measures. Sizable Luftwaffe forces participated in all appropriate army maneuvers, and on a particularly large scale in the 1937 joint Army-Navy-Luftwaffe maneuvers. In general,

however, the ruling viewpoint in Luftwaffe command circles was that air support for the Army would take the form of indirect support through action against the enemy rear rather than that of direct support on the field of battle. Thus, plans for air support provided even up to early 1939 that action by dive bomber units was to be directed at targets in the enemy rear.

These views only changed after the experience gained in the Spanish Civil War and when the outbreak of general war came to be viewed as a possibility, that is in the first months of 1939. Then, the ground support units activated after the Czechoslovakian crisis and some of the existing dive-bomber units were consolidated under General von Richthofen, the last officer commanding German troops in Spain, and transferred to troop training and other areas for accelerated and intensive training in operations closely coordinated with those of the Army. Shortly before the Polish campaign Hitler convinced himself personally of the high standards achieved in this training program.

In 1937 the Army detached an Army Tactics Instruction Staff (Lehrstab fuer Heerestaktik) for assignment to the Inspectorate for Air Reconnaissance and Air Photography. This staff had the mission of promoting an understanding in the Luftwaffe of the science of Army tactics and particularly of the latest experience gained in the operations of mobile troops, which included armored and motorized infantry divisions. By means of demonstration exercises conducted by the Training Air Wing, intermediate and higher level command personnel received instruction from time to time on the most up-to-date experience and views on the subject of the employment of air forces in support of Army operations.

Regulations Governing Army-Luftwaffe Cooperation. While the basic concepts governing cooperation between Luftwaffe and Army forces were established in Air Field Manual No. 16, the field manual entitled "Operations" (Truppenfuehrung) formulated the tactical principles for the Luftwaffe units which would be assigned under Army commands in the event of war. In addition, a number of publications under such titles as Directives (Richtlinien), Guiding Principles (Leitfaeden), and Maneuver and Exercise Comments (Bemerkungen zu den stattgefundenen Truppenuebungen) were disseminated to intermediate and higher level command personnel.

On 1 February 1939 a Tactical Experience Group (Gruppe Taktische Erfahrungen) was established as part of the Operations Division of the Luftwaffe High Command, with the mission of preparing material of this type and insuring its proper dissemination. Of the bulletins and other material thus disseminated some merit special mention, such as:[10]

1) Principles for Tactical Instruction at Service Schools--1937 (Leitfaden fuer den taktischen Unterricht auf den Kriegsschulen--1937);

2) Tactics Bulletin for the Conduct of Operations by Close Support Air Units; CINC, Luftwaffe, Operations Staff, 2 May 1941 (Taktisches Merkblatt fuer die Fuehrung von Nahkampfverbaenden vom Oberbefehlshaber der Luftwaffe, Fuehrungsstab vom 2. 5. 41);

3) Bulletins #1 and 2 on the Operations of Armored Forces Air Units (Merkblatt 1 und 2 fuer den Einsatz von Panzerschlachtflieger);

4) the periodical "Vereint Schlagen";

5) Detailed Tactical Remarks by the Commander in Chief of the Luftwaffe, published by the Operations Branch (Taktische Einzelhinweise des Oberbefehlshabers der Luftwaffe, herausgegeben von der Fuehrungsabteilung).

Weaknesses in the Luftwaffe Training Program. In spite of all the measures outlined above, training in the Luftwaffe and in the Army remained inadequate. Within a very short space of time both the Luftwaffe and the Army repeatedly activated new series of units. The large majority of all Luftwaffe units in existence at the time were divided in 1939 in order to double the number of units, and were not fully brought up to their authorized strength again. The time remaining up to the outbreak of the war was inadequate for the proper training of the units thus newly created. The organizational work thus incurred took up too much time, so that too little attention was given to tactical requirements. In addition, the numerical standards established in the Luftwaffe unit activation program was designed for achievement only in 1942. At the end of 1938 Hitler issued a directive calling for an increase of the Luftwaffe to five times its existing

strength. Training requirements and the lack of adequate aircraft manufacturing facilities, man power, and raw materials to produce the necessary number of aircraft and the necessary quantities of other equipment made it impossible to effectuate these plans. The Luftwaffe therefore entered the war with a far smaller strength than provided for in the unit activation program. In point of numerical strength its forces were planned only for a war on one front.

Because of the heavy superiority of the German military forces as a whole at the time, however, these weaknesses did not result in any disadvantages in the early stages of the war, and actual warfare then served as the best school. There can be no doubt that the establishment of specialized training courses would have proved profitable later in the war, when the conditions of combat became more severe and when new missions, such as that of antitank combat, developed for the air forces.

When Germany later, in 1942, found herself involved in a multi-front war, the strengths available to the Luftwaffe were completely disproportionate to its numerous missions. And the German command took the short-sighted view that the steadily mounting numerical superiority of the enemy made it impossible to spare the time or forces for proper training courses.

When all this had been said, however, the fact still remains that once America and Britain had modernized their hitherto inadequately equipped air forces and had achieved considerably increased numerical strengths, the Luftwaffe from 1943 on found itself in a hopeless situation.

PART II

ARMY SUPPORT OPERATIONS

THIS PAGE DECLASSIFIED IAW EO12958

Chapter 3

AIR RECONNAISSANCE OPERATIONS[1]

Types of Reconnaissance Operations

The mission in air reconnaissance operations was to furnish information on which the army commands could base their operational decisions. This included information on such items as the approach of enemy ground forces, the forward or rearward transportation movements of enemy forces, the current location of enemy reserves--with particular emphasis on mobile units, and the construction of defense systems in the enemy rear, together with current changes and developments. For this purpose it was particularly important to carry out continuing air photo reconnaissance covering rail and road routes in the far enemy rear and in the areas on open flanks.

The mission in tactical air reconnaissance was to provide information for the command and operation of army troops on the field of battle. This included information on such items as the general disposition of enemy forces, the distribution of enemy units, developments of the terrain for defense, and the construction of enemy defense positions. An important item was the identification of motorized and armored vehicles in the current battle area.

Once combat contact was established with the enemy on the ground, the tactical air reconnaissance mission developed into battle reconnaissance and artillery reconnaissance. Together with the other intelligence media available to the army commands, battle air reconnaissance was to furnish information required for the conduct of combat action. This included information on such items as the disposition of enemy forces, in particular the disposition and commitment of enemy artillery, the location of enemy reserves and armored units, and all other developments behind the actual line of combat or main line of resistance. Another mission of air units committed to battle reconnaissance was to observe the progress of the battle on the ground and to determine the current location of the forward friendly lines and friendly infantry or armored spearhead forces.

Air units employed in artillery reconnaissance had two major missions. First, they furnished target data, particularly for fire

against enemy artillery forces approaching or going into firing positions; and, secondly, they observed the placing of adjustment fire by friendly batteries and then reported on the effects of the fire for destruction which followed.

The division of air reconnaissance areas between the air reconnaissance units allocated to the Army and those operating under Luftwaffe commands was defined as follows in paragraph 85 of Air Field Manual No. 16: "As a rule the areas in which the Luftwaffe will conduct air reconnaissance will be farther in the enemy rear than the air reconnaissance areas of the Army and the Navy. Whenever possible these areas will be delimited by a line marked by distinct geographical features."

This definition was formulated under the influence of the assumption that the forces of the Luftwaffe would be employed primarily in the conduct of operational warfare. In contrast with this assumption, airpower throughout the war was employed for direct Army support on a much greater scale than had been anticipated, so that the targets for air attack were usually within the areas defined as Army air reconnaissance areas. It was also within these areas that the ground organization of the enemy air forces was to be found.

Because of these circumstances the provision also quoted in paragraph 85 of Air Field Manual No. 16, as an exception rather than the rule, became in actual fact the rule. "The current situation," the manual observed, "might call for another arrangement. The events of war will frequently lead to changing air reconnaissance areas and air reconnaissance missions."

In some cases the Army and the Luftwaffe conducted air reconnaissance within the same areas. The only difference here was that the air units employed in reconnaissance missions for the Army were required to keep under observation more or less straight lines, such as rail or road routes, as far as the range of operations permitted, while the units carrying out reconnaissance for the Luftwaffe flew on more or less zigzag courses from one target to another. In practice, the reconnaissance missions thus were different in execution although not divided into areas but divided according to the type of mission. It was nevertheless not possible to avoid a certain

THIS PAGE DECLASSIFIED IAW EO12958

overlap in reconnaissance operations, but in most cases this resulted in a more closely meshed reconnaissance picture, something which was to be desired and which would have been hard to achieve in the normal manner because of the inadquate forces available for the purpose. And, in any event, special organizational and signal communications measures (which will be dealt with later in this section) insured a constant interchange of air reconnaissance information between the Army and the Luftwaffe.

In exceptional cases, when special situations made this necessary, air units otherwise responsible for reconnaissance for the Luftwaffe also conducted operational air reconnaissance for army commands. Thus, when the first German troops entered the war in the African theater in 1941, twin-engine fighter units of the Luftwaffe conducted long-range reconnaissance for the Army, since no regular long-range reconnaissance units were available. The mission of these twin-engine fighter units was to keep under observation the areas of western Egypt and seaborne traffic from Egypt to Tobruk.

As a rule air reconnaissance units allocated to the Navy or long-range reconnaissance units of the Luftwaffe conducted air reconnaissance at sea when this was necessary to cover the flanks of ground units operating near a coastline.

The boundaries for air reconnaissance zones within the operational zones of the Army were established by the Army High Command coinciding with the zones allocated to the various army groups. These in turn determined the zones of air reconnaissance for the air reconnaissance units attached to the various field armies.

Deviations from this rule sometimes became necessary when the number of long-range or strategic air reconnaissance squadrons available was inadequate. This was the case, for example, in the Westwall areas, during the Polish campaign of 1939. During this period Army Group C with its three armies responsible for defense of the Westwall had a total of only three squadrons available. Consequently, the whole frontage had to be divided between these three squadrons, without regard for the boundaries of the individual field armies. In Russia also, because of the large areas involved and the inadequate number of long-range air reconnaissance squadrons allocated, it was necessary to divide the frontage into arbitrary zones

without regard for the immense frontages of the individual field armies committed.

During the 1939 campaign in Poland and the 1940 campaign in the west, the Army High Command held two (during the Russian campaign one) long-range air reconnaissance squadrons in reserve. These were not assigned specific reconnaissance areas, however, but were used to secure more closely meshed long-range reconnaissance during confusing or decisively important situations. The situation at Kutno* in the Polish campaign and the assignment of long-range air reconnaissance units to keep under observation the embarkation of the British Expeditionary Corps at Dunkirk might be cited as examples of such situations.

Planning for Air Reconnaissance

At the headquarters of the army commands responsible for army air reconnaissance, the existence of a clear concept of the capabilities and limitations of air reconnaissance was essential.

After pointing out the speed and comprehensiveness of air reconnaissance "under favorable conditions," Air Field Manual No. 16 proceeded to circumscribe its capabilities. It was observed that such reconnaissance was not suitable for detail which is not discernible to the eye or the camera. Further, as the manual cautioned, air reconnaissance is subject to limitations of enemy action, weather, and the time of day. These limitations, however, the manual concluded, were at least partially compensated for by the enormous coverage of which air reconnaissance was capable. These prewar definitions were based on World War I experience and underwent very little change during the war since no radically new technical innovations were placed in operation, particularly in the field of air photography. It is also likely that no radically new developments were available. /

---

* Editor's Note: Kutno, an important rail center, was a key point in the decisive Battle of the Bzura in which a Polish army was captured on 15 September 1939.

/ Editor's Note: See / note, p. 26.

The responsible headquarters of army commands were probably well enough informed on the subject to realize that air reconnaissance, even with the help of air photography, could produce no results when it was impossible to see a well-hidden enemy, for example, when enemy troops concealed themselves in dense forest areas. It was also understood that even with the use of parachute flare bombs and night photographic equipment it was extremely difficult at night to discover troops. For these reasons it was also understood that negative reports provided no grounds for a safe assumption that no enemy troops were present in an area searched by reconnaissance units.

In contrast, it was difficult for personnel who themselves were not aviators to conceive how weather conditions could hamper air reconnaissance operations or the limitations which weather conditions could impose on such operations. For example, army tactical air reconnaissance was seriously hampered and restricted by the very fact that the aircraft types employed in tactical reconnaissance missions at the beginning of the war and even later were not equipped for blind flight or instrument navigation. The only exception here was the FW-189, and it was only introduced during the Russian campaign and was only conditionally capable of instrument navigation.

To army command agencies the performance of tactical air reconnaissance was in painful contrast to that of long-range reconnaissance units. It was difficult to make them see that while technical deficiencies often paralyzed the former at the front, the latter, taking off in the same weather, often broke through the cloud cover far in the enemy rear.

The fact was that the development of equipment for the tactical air reconnaissance units lagged seriously behind the existing possibilities of technological developments,* making bad-weather and night operations of the tactical air reconnaissance squadrons possible on only a limited scale. This disadvantage had made itself felt as early as the campaigns of 1939 and 1940, but it had not been possible to remedy it prior to the opening of the Russian campaign.

---

* Editor's Note: See pp. 24-27.

In the planning of air reconnaissance missions, which represented only one of the numerous sources of intelligence information, the responsible army commands had to take into account all intelligence information already available on the enemy, so that observations made from the air would provide new indications for use in supplementing or checking the information already available. Even the assumed behavior of the enemy had to be taken into consideration, a requirement stated in paragraph 95 of Air Field Manual No. 16.

In accordance with these requirements it was a responsibility of the appropriate army command to decide whether air reconnaissance was to be conducted as a one-time mission and if so at what time (for example, at daybreak to detect the tail end of night movements), or whether missions were to be flown repeatedly over the same area and thus in a series of recurring missions. Quite often it was only after receipt of the first air reconnaissance reports that it was possible to decide on further air reconnaissance activities. This was the case, for example, when the first reports showed the necessity to keep track of detected movements by motorized enemy units.

The points outlined above were the factors which governed the direction of operational and tactical air reconnaissance and particularly of battle air reconnaissance activities. The closer the enemy force involved came to the front areas, and the faster its movement, the greater was the need to keep it under continuous observation, and this applied particularly to armored and motorized infantry units.

Owing to the increasingly effective fighter defenses encountered as the Russian campaign wore on, the German system of continuous observation over the entire reconnaissance area gave way to what was called point reconnaissance. In this system reconnaissance activities were concentrated against specific areas of current operational or tactical importance and were designed to clear up specific questions for the army commands. In addition, reconnaissance aircraft currently in use had by this time become too slow, and were inferior to the increasing numbers of fighters encountered on the Russian side. For this reason a number of tactical air reconnaissance squadrons received single-seater fighter planes to replace their former aircraft. This situation also gave rise at the time to an increase in night air reconnaissance activities.

THIS PAGE DECLASSIFIED IAW EO12958

Another governing factor in the direction of air reconnaissance activities was the number of reconnaissance squadrons allocated or under instructions to cooperate with the army command concerned, and the capabilities of these squadrons.

Operational Air Reconnaissance

Ten strategic air reconnaissance squadrons were available during the campaigns in Poland, the Balkans, and France, and in general this number proved adequate. At the beginning of the Russian campaign, thirteen strategic reconnaissance squadrons were available to the army. This number proved too small to provide adequate operational reconnaissance coverage of the gigantic areas involved in the eastern theater. With only thirteen squadrons available, it was not even possible to assign a squadron to each of the highest level commands of the German Army of the east (three army group, seven army, and four panzer group* headquarters plus headquarters of the Commander in Chief of the Army).

It had been thought that the operational air reconnaissance activities of the air fleets, which at the time were conducted separately from those of the Army, would serve to supplement the intelligence information secured through Army operational air reconnaissance. To a certain extent this was true, but it was nevertheless found from the very outset that operational air reconnaissance for the Army commands could not produce as clear and complete results as had been the case in the former campaigns.

At the start of the campaign the forces of Army Group South were responsible for a frontage of 420 miles, extending all the way from the Black Sea in the south to the Pripyat marshes in the north. With only four strategic air reconnaissance squadrons (to serve the headquarters, the three armies and one panzer group it controlled) available in this large area, operational air reconnaissance naturally had to be conducted in a manner different from that usually adopted in former campaigns. Dispensing with the requirement for army

---

* An army type headquarters but without rear administration echelons.

group headquarters reconnaissance ahead of its armies, Army Group South adopted the following arrangement: one reconnaissance squadron was assigned to the Eleventh Army operating on the far right flank and separated from the rest of the front; two squadrons under central control by army group headquarters were consolidated with the night reconnaissance squadron to form a reconnaissance group responsible for reconnaissance in front of the Sixth and Seventeenth Armies; and the remaining squadron was assigned under the First Panzer Group for long-range reconnaissance missions supporting the panzer group in the execution of its operational mission, so that it was not possible to assign this squadron any specific area of responsibility.

On his own initiative the Luftwaffe General with the Commander in Chief of the Army had organized special night reconnaissance squadrons from the units allocated under his command. Each of these squadrons had nine Do-17 type twin-engine aircraft fully equipped for blind flying and instrument navigation. The intention had been to organize one such squadron for each field army committed in the east, but the Commander in Chief of the Luftwaffe had given approval for only three. These three squadrons were therefore allocated to the three army group headquarters operating in the eastern theater. These three squadrons had to be used not only for long-range but also for tactical night air reconnaissance missions in the operational areas of the army corps, since the normal tactical reconnaissance planes were only conditionally capable of operating at night, a fact which has been explained earlier in this study.

A tactical air support command staff was assigned to each army group headquarters. Under instructions from the army group, this staff, to which the requests of the subordinate armies were channeled, directed all night reconnaissance operations. With the few aircraft available for the purpose it was not possible to conduct systematic and continuous reconnaissance at night, so that only particularly important requests could be met and only those missions flown which held out prospects of success.

A very important factor governing the conduct of air reconnaissance operations was the capability of the available aircraft, in particular their radius of action. In the campaigns in Poland and in the west the only limiting factors which restricted the depth to which reconnaissance could penetrate had been the existing geographical

and political borders. In the eastern theater the restricting factor was the capability of the aircraft available.

The Junkers-88 aircraft in service in the strategic air reconnaissance squadrons of both the Army and the Luftwaffe in the Russian campaign were the best type of aircraft the Luftwaffe had available for such purposes at the time. The Ju-88 had a radius of action adequate for the purposes of reconnaissance for field army headquarters, but a longer range would have been needed to meet the requirements of the Luftwaffe High Command, the Army High Command, and the Army group headquarters. If reconnaissance aircraft with a longer operating range had been available it might have been possible to detect in time the Russian transfer of divisions from Siberia to the front in western Russia, since planes observing the few rail routes across the Ural mountains would have spotted the transport movements.

Finally, another factor which had to be taken into consideration in the planning of air reconnaissance missions was the current air situation--the strength and behavior of enemy air forces and countermeasures taken on the friendly side. In operational air reconnaissance, which was carried out by individual planes and usually at very high altitudes, this factor played a lesser role than in tactical and battle reconnaissance. There was little evidence of any systematic fighter defense activities against strategic air reconnaissance, and no such systematic activities came to the knowledge of the present author during the 1939 or 1940 campaigns or during the campaign in Russia.

Missions for operational air reconnaissance were assigned by the appropriate army command headquarters, usually in writing. Frequently the mission assignment contained instructions for a number of days ahead, which were added to in the form of detail orders from case to case. These instructions, which were frequently included as annexes to operational orders under the heading of "Special Instructions for Air Reconnaissance" (Besondere Anordnungen fuer die Luftaufklaerung) contained points formulated roughly in the following manner.

1) Supplementary information on the enemy situation which was of importance for the execution of the air reconnaissance mission.

2) Information on the air situation, such as the presence of enemy fighter or antiaircraft artillery forces.

3) Information on the commitment of friendly bomber or fighter forces.

4) Details on the width and depth of the reconnaissance areas to be covered for operational and, when necessary, for tactical reconnaissance.

5) The specific operational air reconnaissance mission for the period involved, with emphasis on the information desired by the command, usually accompanied by details on the road and rail routes and other targets, such as defense installations to be taken under observation (by means of air photos).

6) Reporting method. For example, instructions could stipulate that the unit was to report by radio whether it could detect signs that the enemy had crossed a specified river or other terrain feature.

7) Instructions for tactical air reconnaissance when applicable.

Instructions issued by the Fourteenth Army* for air reconnaissance on 1 September 1939, the first day of the 1939 Polish campaign, exemplify the form of a mission assignment from an army headquarters:[2]

1. Reconnaissance Areas.

Northern boundary line for Fourteenth Army air reconnaissance operations: Beuthen-Miechow-Sandomierz.

Depth to which reconnaissance is desired: To a line from Sanck-Zhyrow-San to Przemysl-Sandomierz-Lublin.

Line of division between operational (army), and tactical

* Editor's Note: One of three armies of Southern Army Group. Fourteenth Army was deployed in the Upper Silesian industrial region, eastern Moravia and western Slovakia.

(corps) air reconnaissance.

Air Reconnaissance: Popradtal to Neusandez /Nowy Sacz/-Limanowa-Mussyna-Grybow-Bochnia-Krakow-Wolbrom-Pilica /river/.

2. Instructions to 4th (Strategic) Squadron, 14th Air Reconnaissance Group, on operational air reconnaissance for Fourteenth Army Headquarters:

Detect troop movements against Fourteenth Army; traffic on rail and road bridges over San and Dunajec Rivers, defense preparations at these rivers.

Behavior of troops in and near Krakow and at troop training grounds Bojanow (15 miles southeast of Sandomierz). For this purpose the following must be kept under observation:

a. Rail Routes: Premysl-Chyrow-Sanok-Jaslo-Neusandez /Nowy Sacz/; Przemysl-Jaroslav-Rzeszow-Tarnow-Krakau; Rzeszow-Jaslo; Tarnow-Neusandez /Nowy Sacz/.

b. Road Routes: Przemysl-(Sanck)-Krosno-Jaslo-Gorlice-Neusandez /Nowy Sacz/; Jaroslav-Rzeszow-Debica-Tarnow-Krakow; Sandomierz-Debica-Jaslo; Tarnow-Neusandez /Nowy Sacz/.

The strategic squadron will detect the presence and movements of sizable enemy forces in and from the following zones:

a. From Krakow along the main highways to south and west as far as Nyalenice /Myslenice ?/-Wadowice-Trzebinia.

b. Unloading along the Tarnow-Krakow rail route.

c. The Sanok-Krosno area (between one and two divisions).

It is of particular importance to detect southward movements, towards Slovakia, out of the last-named area above.

Concurrent Missions for the Strategic Squadron:

a. Keep under observation the road route Gdow-Mylenice-Wadowice-Andrychow (field type fortification works).

b. Detect whether Vistula River bridge in existence at Baranow (12 miles southwest of Sandomierz) (Air photos).

3. Tactical Air Reconnaissance for Army Corps. Army Headquarters attached particular importance to early recognition of where stiff enemy resistance is likely to be encountered in the light of the present status of the development of field type fortifications and the concentration of troops (Line: permanent fortifications in the /southwestern/ Polish industrial region of Nikolai-Pless/Pszczyna/-Bielitz /Bielsko/-Saybusch).

Instructions of the above type were customary at the time when the various army command headquarters still had tactical control over air reconnaissance units, and were formulated with assistance from the attached tactical air support command staff. After the Luftwaffe had assumed responsibility for tactical air reconnaissance for the Army the procedure changed. Luftwaffe liaison teams attached to the various army headquarters served in an advisory capacity to the army staff and forwarded the requests of the army commands for air reconnaissance to the appropriate Luftwaffe commands. These commands coordinated army desires with their own reconnaissance plans and forwarded them, in the form of orders, to their air reconnaissance units.

Tactical, Battle, and Artillery Air Reconnaissance

In planning tactical air reconnaissance missions it was essential to make use of the results obtained in operational air reconnaissance if this could be done without causing undue delay. If no operational reconnaissance results were available the targets for tactical air reconnaissance had to be farther afield, at times as far as the maximum operating range of the aircraft employed.

As long as the tactical air reconnaissance squadrons intended for such purposes remained under tactical control by the Army, tactical, battle, and artillery air reconnaissance activities were

THIS PAGE DECLASSIFIED IAW EO12958

directed by means of direct orders from the army corps or armored division headquarters to the squadrons. In the organizational field, by the beginning of the Russian campaign a group command staff, together with a tactical air reconnaissance squadron, had been assigned to each panzer corps, and one so-called armored division tactical air reconnaissance squadron (Aufklaerungsstaffel--Panzer) to each armored division.

The number of such squadrons available was large enough during the campaigns against France and Poland, and also in the Russian campaign, to make it possible generally to assign one tactical air reconnaissance squadron under each army corps. Only a small number of army corps had no tactical air reconnaissance squadron of their own. These latter were forced to rely on the reconnaissance conducted by adjacent corps, and this naturally resulted in complications and delays in the assignment of missions and in reporting. New tactical air reconnaissance squadrons were activated, however, so that the Army at the beginning of the Russian campaign had a total of 36 normal tactical air reconnaissance squadrons plus 20 armored division air reconnaissance squadrons, compared with a total of only 30 normal tactical air reconnaissance squadrons available at the outbreak of the war.

Compared with the units available in the 1939 and 1940 campaigns, however, the capabilities of the squadrons available in the Russian campaign were considerably smaller. Instead of the nine planes per squadron, the normal squadrons now had only seven planes each, while those assigned to the armored divisions had a strength of only six planes each. Furthermore, the squadrons now no longer had their reserve of three planes each. With their smaller authorized strength of only seven planes and in view of the increased frontages held by the individual corps in the Russian campaign, the demands made on the squadrons had to be reduced. To make matters worse, the inadequacy of their aircraft equipment reduced the range of operations for which the squadrons could be used. Reference has already been made to the limited operability of the aircraft during periods of bad weather and at night, a deficiency which was only improved by the introduction of the FW-189 model planes.

These factors and the wide range of missions involved imposed restrictions on the commands responsible for the commitment

of tactical air reconnaissance squadrons.

As long as the corps and the armored divisions had tactical control over their own tactical air reconnaissance squadrons, the reconnaissance mission was formulated in a Special Instructions for Air Reconnaissance Annex to operational orders. The instruction annex contained items similar to those listed previously in the case of operational air reconnaissance.

For artillery air reconnaissance, the annex would contain instructions, for example, to make available an artillery observation plane to the artillery commander of 2d Division from daybreak on to report on the placing of artillery fire. A second artillery observation plane might be required to direct the adjustment fire of heavy flak trajectory batteries of the corps artillery. In addition, instructions concerning voice radio communication and the designation of receiving points for air-drop messages would be included.

Written orders of the above type as a rule applied only to the first missions flown on the day concerned. If further air reconnaissance missions were required, the air liaison officer received them orally and transmitted them to the squadron or, in cases of extreme urgency, to the crew of one of the aircraft on the ground at the tactical airfield. In the case of the squadrons assigned under armored divisions oral instructions were more usual. The operations of these squadrons were more or less in the nature of extended battle reconnaissance and had to be adapted to the speedy movements and rapidly changing directions characteristic of operations by armored units. For this reason reconnaissance instructions had to be given in a brief, quick form. The squadrons assigned to armored divisions had a highly flexible ground organization service, with personnel and equipment specially selected for the purpose. The signal equipment of these units was based primarily on radio communications.

Direct orders from the army command to the aircraft crews were a rare exception resorted to only in very exceptional circumstances. The responsible army command gave its instructions to the squadron leader, and it was his responsibility to distribute the missions among his crews with orders as to the execution, insuring the most rational use of his units.

After the Luftwaffe had assumed responsibility for army air

reconnaissance and had consolidated the squadrons to form tactical air reconnaissance groups, the assignment of missions followed the pattern generally in use in cooperation between the flying forces of the Luftwaffe and the Army. If no agreement existed for direct cooperation between the army corps headquarters and a squadron of the tactical air reconnaissance group concerned, the corps forwarded its request for tactical, battle, or artillery reconnaissance support through its attached air intelligence officer to the appropriate air corps or air division headquarters.

The Execution of Air Reconnaissance Missions

As a rule operational air reconnaissance missions were flown by individual planes. The strategic air reconnaissance plane was to fly as inconspicuously as possible and was to avoid air combat if at all possible. Admittedly Air Field Manual No. 16, paragraph 91, did contain a provision for unit-sized missions "against strongly defended areas or targets" requiring heavy defensive firepower. But in practice this never happened in the case of strategic air reconnaissance, at least not in missions for the Army. In like manner no occasion is on record of strategic reconnaissance conducted under direct protection by fighter forces. The fighter forces available were at no time adequate for such purposes.

During daylight, strategic air reconnaissance usually had to be conducted at high altitudes (between 16, 500 and 26, 400 feet) to achieve a greater degree of safety against possible fighter attack. During such missions the plane could usually descend to lower altitudes, particularly in the wide expanses of Russia, once it was far behind the enemy front lines, in order to get a better visual view of details. Low altitude strategic reconnaissance missions produced particularly good results but had to cease when the Russian fighter defenses increased in strength.

The main purpose of night time operational reconnaissance was to detect troop movements on roads. The units employed operated at lower levels than during daylight and used parachute flare bombs to light up the area under observation and flashlights for air photography.

The depth to which operational reconnaissance could penetrate in the eastern theater was limited only by the operating range of the aircraft employed.

Air photography was used to confirm the observations made by eye and, primarily, in reconnaissance operations at very high altitudes exceeding the power of human vision. The main purpose was to secure air photos of such targets as rail depots, built up areas, supply depots, and airfields, and panorama photos were taken of entire rail and road sections to determine the density of traffic on them. Immediately after air photo films were processed* in a preliminary interpretation, the results which were most important were passed on to the proper quarters, followed by the results of the final interpretation from the positives after these had been prepared.

In operational reconnaissance radio reporting was used only in exceptional cases while the aircraft was on its mission, since radio messages could be intercepted by the enemy and would have revealed the whereabouts and course of the reconnaissance plane and exposed it to fighter attack. The only cases in which radio reports were required were those in which it was essential to inform the army command very speedily of certain observations made, for example the detection of large enemy motorized forces, or if it was essential to inform the command speedily of no signs discovered of enemy troops within a specified area.

Normally, the report was made orally, after landing, to the squadron leader, who passed on particularly important or urgent reports to the appropriate tactical air support command staff or the army command involved, or who instructed the reconnaissance pilot to make such reports directly. In some cases it was desirable for the air observer to report orally to the tactical air support command staff or army command concerned. As a rule the reconnaissance reports were then formulated in writing, when necessary with marked sketches, and forwarded to the appropriate headquarters.

In all campaigns the army commands paid full tribute to the strategic air reconnaissance arm. With the exception of enemy

---

* Called the "wet interpretation" (Nassauswertung).

preparations in the southern and western theaters from 1943 on, where German airpower was so markedly inferior to that of the Western Allies that air reconnaissance operations were completely impossible, the operational air reconnaissance forces accurately detected all sizable enemy intentions.

The War Journal of Army Group A covering the first phase of the 1940 campaign in the west contains numerous entries on the road and rail movements of French and British army elements. All of these had been detected by air reconnaissance and the information thus furnished had served as the basis for interpretation of the current situation. For example, the entry for 25 May reported:

> The intelligence information available was supplemented in the course of the afternoon by air reconnaissance, which reports enemy forces moving north and northwest (toward Ostende and Dunkirk) from the Lille-Douai-Valenciennes area. While this weakens the assumption that these enemy forces intended coordinated action with the forces south of the Somme, it emphasizes the necessity to close also the envelopment in the north.

In his advance from the Syrte in April 1941, Rommel decided not to follow the British forces along the hard coast road but to follow in an enveloping pursuit through the desert instead. In making this decision his views were confirmed by the information secured through air reconnaissance, as is revealed in a study on the campaign in Northern Africa. [3]

Night air reconnaissance also in many cases furnished information which influenced the operational decisions of the command. An entry in the War Journal of General Franz Halder, Chief of the Army General Staff, contained one piece of information which was exceedingly important for the command, [4]

> Nachtaufklaerung (Night Reconnaissance): From the zone of the Fifth Russian Army: On all roads troop movements towards the east, against the Dnepr River (!). We have drawn attention to this possibility for days past. Army Group South has always denied these possibilities.

As in the case of operational reconnaissance, tactical, battle,

and artillery reconnaissance missions as a rule were executed by individual planes, which did their utmost to avoid air combat. When the enemy air forces were particularly active, it was customary to provide for fighter action to coincide in timing with the operations of reconnaissance aircraft within specified areas. In practice the arrangements for coordinated action of this type were usually, and more easily, made by direct agreement between the reconnaissance and fighter units concerned rather than by means of instructions from superior headquarters. This was particularly the case when the units were based on the same airfield or on separate airfields adjacent to one another. Thus, cooperation was always excellent between the tactical air reconnaissance squadrons and Fighter Wing Moelders* in Russia. Moelders fulfilled every request of the reconnaissance units that it was possible to fulfill. In most cases, however, tactical reconnaissance units had to carry out their missions without fighter protection.

When the Russian fighter defenses in the front areas increased to such a strength that the whole conduct of tactical air reconnaissance became problematical, some of the reconnaissance squadrons received single-seater fighter aircraft with automatic air photographic equipment in place of their old types of planes. These planes always operated in a strength of at least two, with the pilot of one plane carrying out the reconnaissance mission while the other maintained a watch for enemy fighters. On rare occasions it was even necessary to commit the planes in formations of four when the Russian air forces were particularly active.

These fighter-reconnaissance planes naturally could not be used for all types of reconnaissance missions, among which was the difficult mission of artillery reconnaissance, and were employed primarily to keep road routes under observation, a mission they were also able to execute in low-altitude operations.

Editor's Note: The 51st Fighter Wing (equipped with Me-109's), commanded by Colonel Moelders, was a component of the II Air Corps (Fliegerkorps), Second Air Fleet (Luftflotte). Second Air Fleet was deployed with Army Group Center, and II Air Corps with Fourth Army and Second Panzer Army.

THIS PAGE DECLASSIFIED IAW EO12958

The altitudes at which aircraft carried out tactical reconnaissance missions during daylight varied greatly in accordance with the type of reconnaissance required, current weather conditions, and the enemy defenses encountered. Tactical reconnaissance extended to a depth of 120 miles behind the enemy main line of resistance. The aircraft generally flew at high altitudes over the enemy lines, but, once in the enemy rear, would descend to lower altitudes in order better to detect details if the mission assigned made this necessary and if the air situation was such that the risk could be accepted. Fighter-reconnaissance planes were particularly suited for operations of this type because of their great climbing ability, speed, and maneuverability. When on missions restricted to air photography, the planes operated at great altitudes, which varied from 16,500 feet upward according to current weather conditions.

Daylight battle reconnaissance missions were usually flown at altitudes below 6,600 feet. During the night, planes had to operate at low and sometimes almost at ground altitudes, and this was even necessary during daylight if the mission assignment required the detection of details, or if the mission was one of observing the advance of friendly troops. Battle air reconnaissance was very largely dependent on the current air situation, and in many cases the planes assigned such missions had to be protected against enemy action by friendly fighters or by antiaircraft artillery.

In most cases artillery air observers had to adapt their operating altitude to their current mission. For example, a plane assigned to observe the placing of fire by the heaviest types of flat trajectory guns against targets far in the enemy rear would fly as high as clear observation would permit. Planes assigned to observe fire from lighter caliber guns or to report the general placing of friendly artillery fire would fly back and forth at low altitudes between the target and the friendly artillery positions. During their missions they behaved in very much the same way as battle reconnaissance planes and also required protection by fighters or antiaircraft artillery.

Tactical air reconnaissance units were frequently used by the army commands for photographic map surveys of large areas, for example to obtain continuous strip photos of specific terrain sectors, such as rivers or other defense positions as a precautionary measure.

In Russia, where the available maps were incomplete and contained inaccuracies, the photo coverage thus obtained was used to prepare photo maps, true-to-scale air photo mosaics, and normal maps. An example is the mapping work done at headquarters of the LII Corps in 1941 in preparations for crossing the Dnepr River. As early as 20 August the assigned reconnaissance squadron was employed in photographic missions along the road, preparing photos with an approximate scale of 1:20,000, which of course would plainly reveal detail along the shores of the river. As a result of this work, it was possible to prepare quickly a provisionally rectified grid photo map in four sections, drafted on the same scale as the photographs. This map, printed in two colors, was furnished to the command staffs and to the assault boat and engineer detachments. [5]

Following the introduction of the FW-189 plane for use in night air reconnaissance in tactical reconnaissance units, night reconnaissance missions increased. Another factor which made it necessary to concentrate more on night air reconnaissance was the increasingly large numbers of fighters committed on the Russian side. The 4th (Tactical) Squadron,* 31st Air Reconnaissance Group, for example, was employed increasingly in night reconnaissance missions from January 1943 on, directed at the areas on both sides of the Smolensk-Lirssno highway. In these missions the aircraft of the squadron penetrated to a depth of 60 miles. Other examples of successful night missions by the same squadron included highly effective night artillery fire direction against the Veliki Luki rail depot, as well as profitable night air battle reconnaissance for the IV Corps from the Gorodok-Nevel-Vileika rail depots/ as far as the region on both sides of the Orsha-Smolensk highway. [6]

It is probable that in some cases inadequate night air reconnaissance had adverse repercussions on the conduct of operations. This can be assumed from the following statement by Polish General Kutzreba concerning a Polish attack against the German Eighth Army on 10 September 1939, in which the Poles achieved tactical surprise

---

* Editor's Note: The 4th (Tactical) Squadron was presumably a component of VIII Air Corps, Second Air Fleet.

/ Editor's Note: Gorodok and Nevel are almost directly north of Vitebsk in Belorussia, while Vileika /Vileyka/ is northwest of Minsk.

with superior forces. General Kutzreba considered that the Germans had underestimated the Polish force (three infantry divisions, two brigades and one regiment of cavalry) as a result of only daylight reconnaissance. The Polish force had attempted to confine its movement as far as possible to hours of darkness, since, as General Kutzreba observed, "We had already been able to learn from experience that the German air forces . . . customarily ceased operations before evening."

Another point which becomes obvious from the above account is that in this case air reconnaissance during the hours of evening dusk had been neglected. On the basis of experience gained in World War I, great importance had been attached to air reconnaissance missions carried out during dusk, since it was frequently possible in this way to detect the start of troop movements, or, in the morning, to detect the tail end of such movements. Throughout the war early morning and late evening air reconnaissance was common practice.

That the command failed to attach greater importance prior to the war to night air reconnaissance and to promote such activities through the allocation of appropriate types of aircraft and through special training was a serious omission. Air Field Manual No. 16 merely stated that night air reconnaissance at times "may be necessary."

Reporting Equipment and Techniques

Use was made at times of what were called point maps (Punktkarten). In these maps precisely surveyed salient terrain features, such as road intersections, bridges, large individual buildings (such as churches or factories) were marked by a black dot and a number. All the airborne observer had to do was to report his observations and/or targets by point number and state its lateral and longitudinal distance from that number, thus giving the position of his reported observation or target in relation to the referenced point number. Point maps of this type could be produced speedily on the spot whenever required with field type equipment.* Very frequent use was also made of grid maps. In this method a map or an air photo was divided

* See Appendix 1.

into squares and targets observed were reported accordingly.* Small celluloid angles were used to determine subdivisions of the squares.

Tactical and battle reconnaissance planes, particularly the latter, reported while airborne by voice radio to their squadron headquarters, with the air liaison officer attached to the appropriate army command listening in. Artillery observation planes reported, also by voice radio and while airborne, directly to the artillery unit they were supporting. If radio communications failed, or when reporting to a command with which no air-ground radio channels existed (as was the case with spearhead units and infantry staffs) use was made of the airdrop message system, a smoke cartridge being dropped with the message to facilitate its finding. In special cases, for example to give the precise location of an enemy artillery position, the airborne observer could, even during daylight, remove a film from his film case and deliver it by air drop for immediate development and interpretation.

In general, each observer, immediately after landing at his base airfield or tactical air strip, reported orally to his squadron leader or air liaison officer. Important items from the report were transmitted orally and immediately to the appropriate headquarters by the squadron leader or air liaison officer as advance reports. In special cases it was sometimes necessary for the observer to report personally to the appropriate headquarters.

As was the case with reports by operational reconnaissance observers, discussed previously, the items reported by the observer orally were formulated in writing in an "observer's report," which stated more or less the following points:

1) Assigned mission.

2) Route and altitude of flight.

3) Maps used.

---

* Editor's Note: Examples are extant in Appendices 2a and b in unpublished appendices of USAF Historical Study No. 163. Karlsruhe Document Collection.

4) Precise details on observations made, usually in chronological sequence and with precise information on the location and time of the observation.

5) Uncertain observations or assumptions, specifically stated as such.

6) Details on air photos taken.

7) Air situation items: enemy aircraft sighted individually or in unit formation while airborne, with details on the types of aircraft, time and altitude of observation, and information on air combat, and whether antiaircraft artillery fire had been encountered.

8) Miscellaneous items: weather conditions, technical failures while in flight--engine trouble, or failure of weapons or other items of equipment.*

Processing and Interpretation of Air Photos

To insure speedy interpretation and intelligent use by the ground forces of the large numbers of films secured through air photography, it was essential to have a special air photo service organization. As a rule the air photo section of the air unit whose planes had taken the photos developed the film and prepared a preliminary interpretation from the negative. The purpose here was to ascertain whether the photo revealed enemy measures which required immediate counteraction. It had to be decided whether the information was to be transmitted immediately to the appropriate army headquarters for operational or tactical decisions of combat action, or whether an immediate repetition of the reconnaissance mission was needed.

If the area photographed was within the enemy battle zone, the film was forwarded without delay by the air unit photographic

* An example is extant in Appendix 3 in unpublished appendices of USAF Historical Study No. 163. Karlsruhe Document Collection.

section to the headquarters photographic section of the field army concerned. This section received all intelligence data reaching the army headquarters from other sources (such as agents, prisoner interrogation, ground reconnaissance), so that the section was in a position to verify such intelligence data by the photos, or to use it to facilitate a proper interpretation of the photos. The results obtained by these processes were forwarded as speedily as possible to the command and troops in the form of photo interpretation reports or photo interpretation sketches.*

The results of the air photo interpretation were reported in various ways. Simple results were consolidated in a written air photo interpretation report. Air photo "sketches"/ or overlays were used for the reporting of more comprehensive results.

Exchange and Dissemination of Results

The speedy and adequate dissemination of information obtained by means of air reconnaissance to all Army and Luftwaffe commands concerned required constant, close attention, and special measures. In addition to the army commands concerned, the Luftwaffe also always had an interest in the results of air reconnaissance in order to be able, when appropriate, to commit air forces against detected targets as part of the army support mission.

For the above reasons air reconnaissance reports were exchanged constantly between the tactical air support command staffs and liaison teams attached to army group, army, and panzer group headquarters, and directly between the various Army and Luftwaffe commands. This exchange of information was handled by the G2 sections as a rule, and in particularly important cases by the G3 sections, the chiefs of staff, or the commanding officers themselves.

---

* Editor's Note: Chart showing organization of the Luftwaffe Air Photo Service, in Appendix 5, unpublished appendices of USAF Historical Study No. 163. Karlsruhe Document Collection.

/ Editor's Note: Appendix 4 in unpublished appendices, USAF Historical Study No. 163. Karlsruhe Document Collection.

In spite of all the careful agreements reached and arrangements made, it was only natural that friction frequently developed in this interchange of information. Prior to the Russian campaign the Commander in Chief of the Luftwaffe therefore again issued detailed orders on the subject of the interchange and the interpretation of intelligence information from air reconnaissance sources. Air reconnaissance reports were to be consolidated at air fleet and air corps headquarters and the headquarters of the close support air commands assigned under the latter; the tactical air support command staffs and air liaison teams attached to army group, army, and panzer group headquarters. The intelligence sections or intelligence officers of these headquarters and attached staffs were responsible for the examination of all intelligence reports and for an appropriate selection to be disseminated, and also determined to which headquarters and staffs and by what means they were to be distributed.

In addition, the tactical air support command staffs were required to broadcast three times daily by radio a consolidated digest of the reconnaissance reports. So far as they were of general interest, reports turned in by air units other than those engaged in air reconnaissance were to be included in these broadcasts.

The orders stressed the requirement to make proper use of the results obtained by air photo reconnaissance and to pass on the information thus received.

Special attention was drawn to the necessity to maintain secure communication channels of all types, including direct wire communication channels between the Luftwaffe and Army commands, to assign liaison officers radio facilities and liaison aircraft, and to exchange current information daily on the locality of airdrop message receiving points and landing strips for liaison planes of the Fieseler 156 (Storch) type. In addition to the above, the orders contained instructions for the exchange of liaison officers between the tactical air support units and the tactical air support staffs attached to panzer groups, air corps, and armies, and army groups, as well as the air fleet headquarters. [7]

Return to Luftwaffe Control of Units Formerly Allocated to the Army, 1942

The immense expanses of the eastern theater of operations resulted in excessive demands being made on all forces available. Consequently, the organization hitherto in force no longer suited the purpose, and it was found essential to carry out severe measures designed to bring about a more economical use of the means available.

Certain debilitating factors in the air tactical situation became quite evident. Owing to the gigantic extent of the theaters in which ground forces of the Army were operating and to the necessity to conduct operations in a number of theaters, the Luftwaffe General attached to the Commander in Chief of the Army, and the tactical air support command staffs he controlled at the various Army headquarters, could no longer bring the necessary influence to bear in matters of the tactical use, training and supplies and replacements, and disciplinary command over the units concerned. In addition to the tactical air support staffs attached to the various army commands, the Luftwaffe commands required to cooperate with these army commands also assigned liaison officers or teams to them. This dual representation of the Luftwaffe was found undesirable, irrational, and the source of much friction.

As early as the late autumn months of 1941 the air reconnaissance units allocated to the Army were at an exceedingly low level of operability. This was due to heavy attrition of their equipment of all types, particularly aircraft and motor vehicles, the inadequate replacements which could be made available to them, and shortages in aviation and other motor fuel. In addition, the exceptionally early arrival of winter in 1941 resulted, by the end of the year, in the average operable strength of the squadrons having sunk to a level of only one or two aircraft each. Finally, the expenditures required to maintain unit ground service installations for the individul squadrons was no longer commensurate with the number of operable aircraft available in them. Thus, at the end of 1941 only 19 of the 56 tactical air reconnaissance squadrons committed at the beginning of the Russian campaign could be left in action, while 37 had to be withdrawn. A similar situation existed in respect to the strategic squadrons.

Since the Commander in Chief of the Luftwaffe was in no

position to bring these squadrons up to and maintain them at full strength, no other possibility existed than to consolidate the air reconnaissance services of the Army with those of the Luftwaffe in order to maintain at least a limited number of reconnaissance units through strict rationalization. *

The new organizational system set up by the end of February 1942 provided that the Luftwaffe was to assume responsibility for air reconnaissance serving the purposes of the Army. After a transition period lasting up to the winter of 1942 no units organic to the Luftwaffe would remain under tactical control by the Army. Instead, the air reconnaissance forces of the Luftwaffe were only required to cooperate with the various army command headquarters in the same manner as that in force for other air units assigned under the air fleets. Operational air reconnaissance for the various Army command headquarters was to be conducted by the strategic units of the Luftwaffe as an additional mission.

The subject of transferring the responsibility for army air reconnaissance to the Luftwaffe had been broached by the Wehrmacht High Command as early as after the 1940 campaign in the west, but had encountered opposition by the Commander in Chief of the Army. The Army was unwilling to become more dependent on the Luftwaffe than it already was. Furthermore, the Army contended, not without cause, that operational reconnaissance to serve the purposes of air operations was often conducted in accordance with viewpoints differing from those essential for army air reconnaissance. For these reasons the Army and the Luftwaffe each conducted their own air reconnaissance separately during the initial stages of the Russian campaign.

The mission of tactical and battle reconnaissance for the Army (including reconnaissance for the artillery and the infantry) was assigned to the tactical reconnaissance groups newly formed through the consolidation of the former normal army squadrons and the squadrons allocated to armored units under group headquarters. The number of these groups was kept as small as possible, and only 35 were organized. The groups were under complete control by the

---

* Editor's Note: As used here "rationalization" means organization on scientific principles of management, etc. for greater efficiency.

various air corps or air divisions, which designated the squadrons to cooperate with specific infantry corps and armored divisions. In addition to the mission of army air reconnaissance the groups also had to assume responsibility for tactical air reconnaissance for the air corps and divisions. Some of the squadrons in these groups received single-seater aircraft equipped with instruments for air photography, but the majority retained their FW-189 twin-engine, three-seater reconnaissance type planes.

The Chief of Air Reconnaissance Forces received instructions to remain with the Commander in Chief of the Army during the transition period to serve in an advisory capacity and to maintain liaison with the Commander in Chief of the Luftwaffe. He had no tactical command or disciplinary authority but exercised only the functions of an inspector of all air reconnaissance units, including air reconnaissance schools and air reconnaissance replacement units, etc., and was controlled functionally by the Chief of the Luftwaffe General Staff. The orders also directed the assignment of Luftwaffe liaison sections to the various army group and army headquarters and of Luftwaffe intelligence officers to the intelligence sections of other army commands with the mission of transmitting the requests of these headquarters to the air fleets or air corps instructed to support them.

The outcome of the transfer of all responsibilities for Army air reconnaissance to the Luftwaffe was that the Luftwaffe in an increased measure had to assume responsibility for measures to insure the transmission of results obtained in air reconnaissance to the various army commands in an appropriate form, using for the purpose the system of air liaison sections and air liaison officers, a system which was improved continuously. That the new organization time and again resulted in friction is evidenced by an order issued by the Commander in Chief of the Luftwaffe in the summer of 1944. The Reichs Marshal observed that, although the new system had worked well, "some commands . . . have failed to recognize these interrelations and missions and have not carried out orders in the proper spirit."[8]

The above order therefore provided for a more closely integrated system of lateral liaison, particularly between the tactical air reconnaissance squadrons and the appropriate army commands, and

for the establishment of radio communication channels to supplement the network of wire communications.

The advantages of the new sytem over the old were as follows:

1) The duplication of effort in air reconnaissance (particularly operational) which resulted when Luftwaffe-controlled and Army-controlled reconnaissance units operated within the same reconnaissance areas was avoided.

2) Clear cut chains of command resulted from the discontinuation of divided command authority, namely, tactical command authority by the Army, and disciplinary and administrative control by the Luftwaffe.

3) A more uniform use of air power was possible than was the case when the units were controlled by the Army.

4) Establishment of the air reconnaissance groups and the assignment of these groups under higher level air commands, which were usually nearer by than the controlling army headquarters had been, insured improved care of the troops and facilitated appropriate service supervision.

5) Complete integration of the units with their respective parent air units insured improved replacement services in respect to aircraft, other items of equipment, and aviation fuel.

6) Consolidation of the individual air reconnaissance squadrons under group headquarters resulted in a reduced ground service organization. Only one air base being required for use by all squadrons of a group made for a more economical use of personnel and servicing equipment.

There were also serious disadvantages resulting from the new rationalized system:

1) The reduced number of tactical air reconnaissance units made it impossible to assign one squadron to support each infantry corps or armored division. Instead, a single squadron in many cases had to assume responsibility for air reconnaissance for a

number of army headquarters.

2) A squadron supporting an army command was no longer able to use an air field near the supported army command but had to operate from the group air base which was farther away. This, and the situation described in 1) above, loosened the very close contact which had hitherto existed between each squadron and the army headquarters it was supporting. This in many cases complicated the assigning of missions and the process of reporting.

For the above reasons the new system could only be considered as a temporary emergency solution.

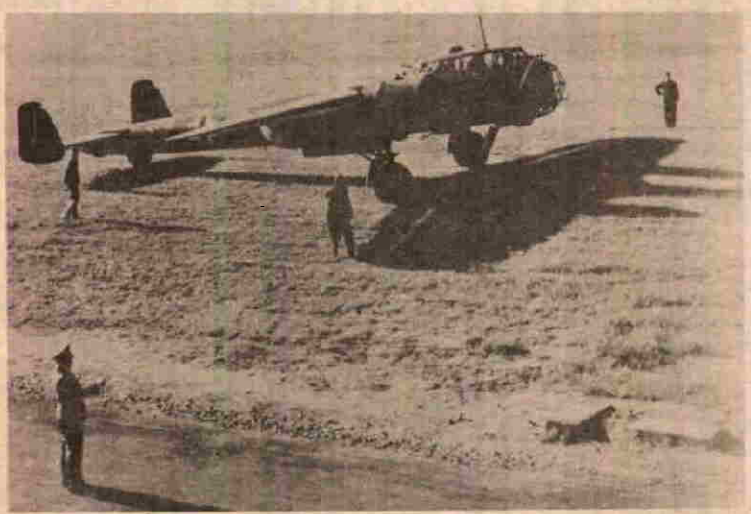
In the case of operational reconnaissance it was found that the new arrangement, in which Army and Luftwaffe air reconnaissance activities were combined, did not lead to any considerable savings in forces. For army purposes, units engaged in operational air reconnaissance were required to observe road and rail routes, enemy rearward sectors, and support lines as far as the operating range of the plane permitted. They thus had to report on their observations on more or less connected straight lines. Operational air reconnaissance for the Luftwaffe was directed at individual points, some of them far apart, such as airfields, industrial installations, and so forth. As a rule this meant that the units employed in such missions had to fly criss-cross from point to point. It usually proved necessary to employ separate aircraft in each of these two types of air reconnaissance.

As will be explained later in this study, it would have been a sounder policy at the beginning of the Russian campaign to give the tactical air support command staffs attached to the individual army group and army headquarters the status of tactical air command headquarters. For this purpose they should have been expanded and assigned full command authority over all tactical air forces, including air reconnaissance units, engaged in permanent missions of army support.

As was the case with the strategic air reconnaissance forces, the tactical air reconnaissance forces in all campaigns fought in World War II proved a reliable support for the Army, and wherever they were committed earned full recognition by the army commands

and troops. Commanding officers at all levels of the Luftwaffe also at all times emphasized the achievements of the tactical air reconnaissance units. This high praise was particularly well merited since the tactical air reconnaissance personnel, in contrast with the personnel in all other types of air units, had to rely, each man individually, almost completely on their own resources in executing their missions. This fact is brought out clearly in numerous acknowledgments by command headquarters of the Army.

Ju-87's (Stuka) in flight, near Rzhev, 14 Aug. 1942



Dornier 17F - Reconnaissance

Me-109 in flight

FW-190 taking off

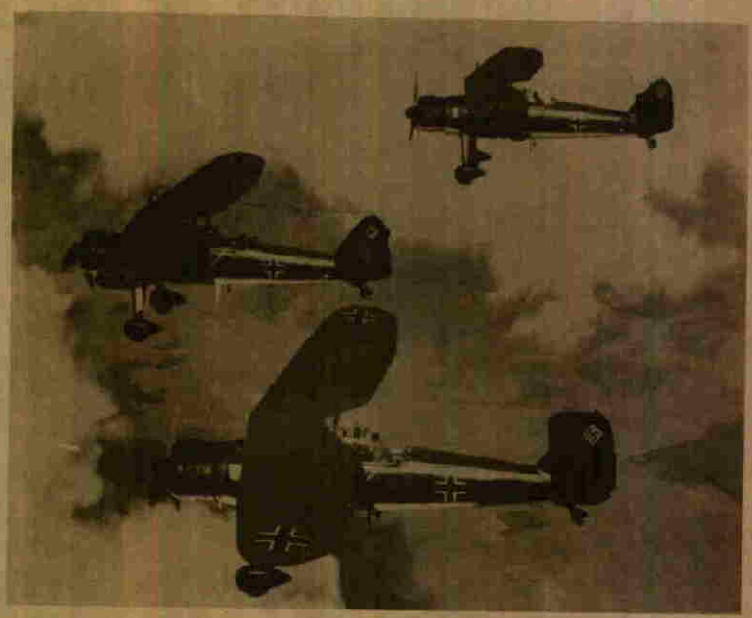
THIS PAGE DECLASSIFIED IAW EO12958

Heinkel 45 (He-45)

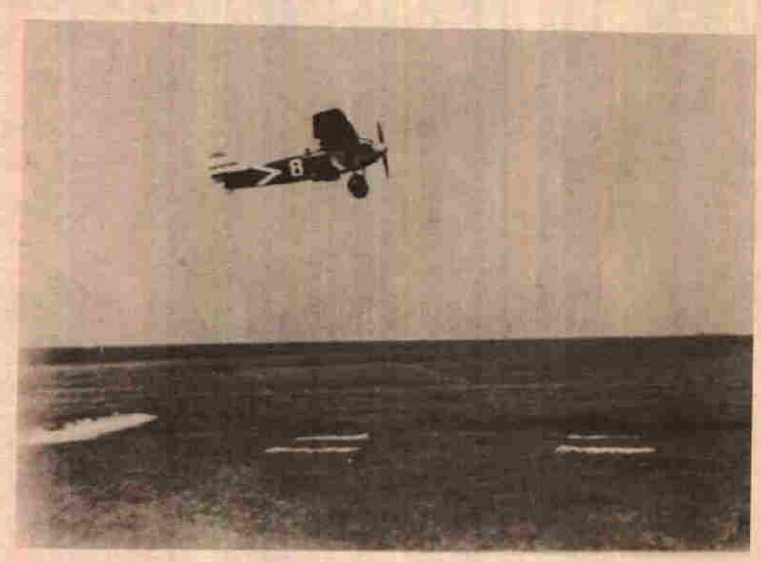
FW-189

THIS PAGE DECLASSIFIED IAW EO12958

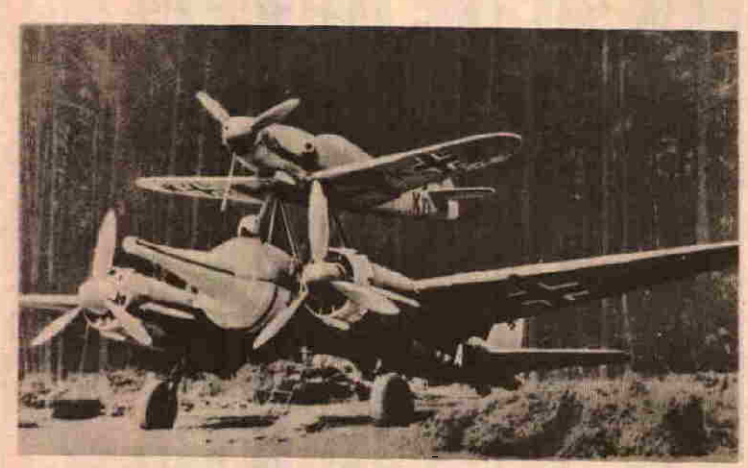
Heinkel 46 (He-46) in flight



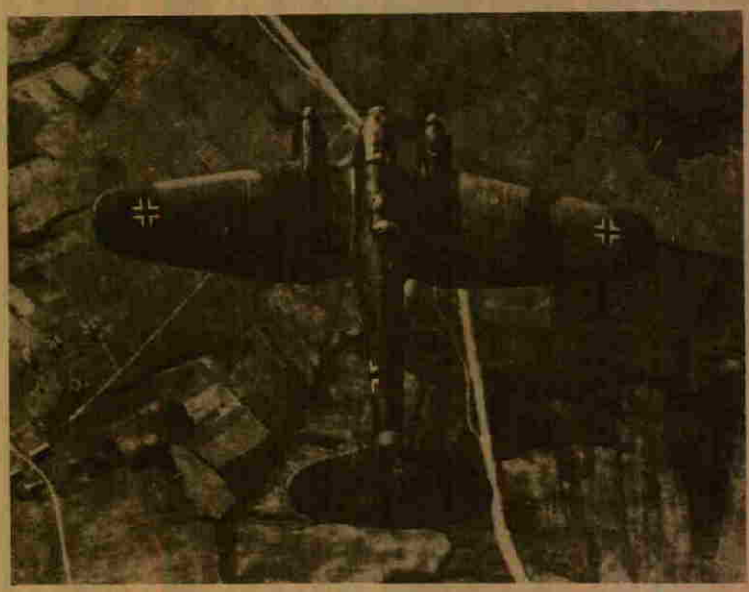
Henschel 126 (Hs-126)



Fokker D XIII (fighter-bomber). Dutch aircraft used by Germans for practice bombing in Russia, Lipetsk 1928

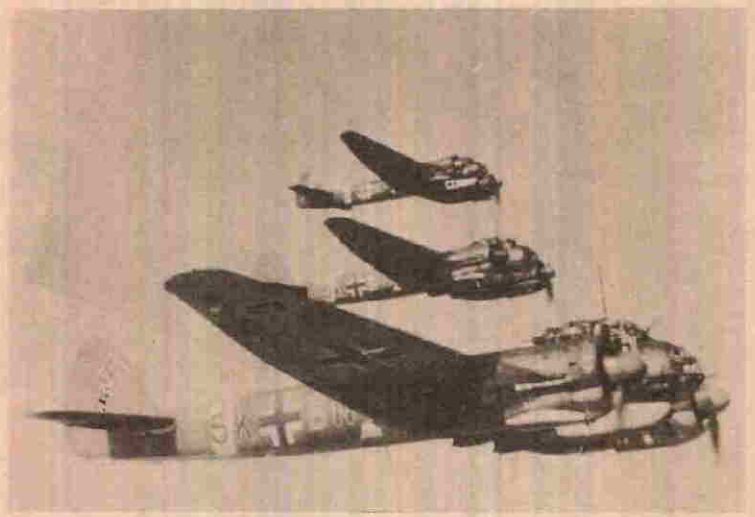


The "Mistel"

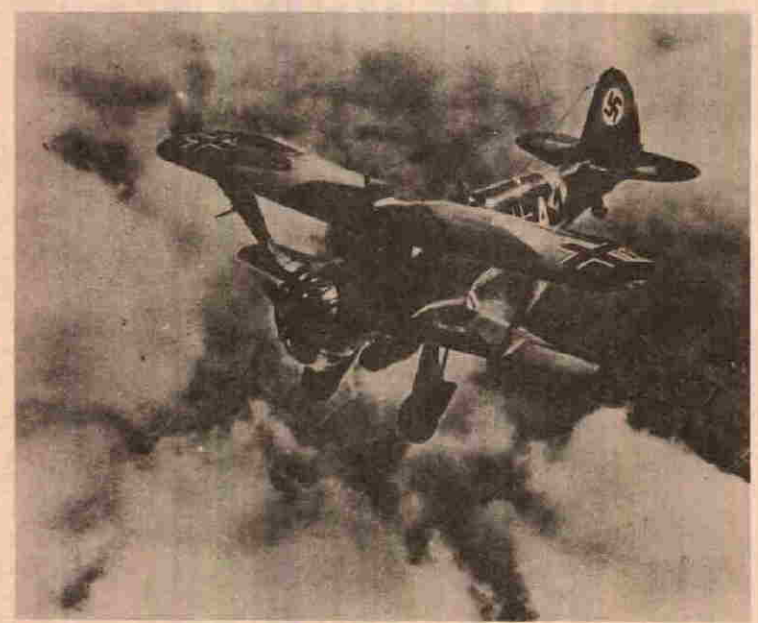


Heinkel 111 (He-111), II Air Corps, Russia 1941

Dornier 17Z (Do-17Z)



Ju-88's on combat flight, Russia



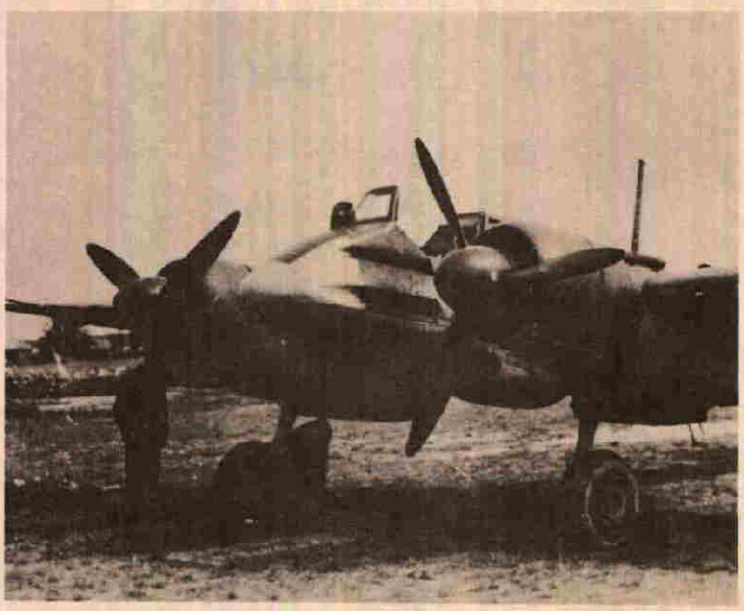
Henschel 123 (Hs-123)

THIS PAGE DECLASSIFIED IAW EO12958

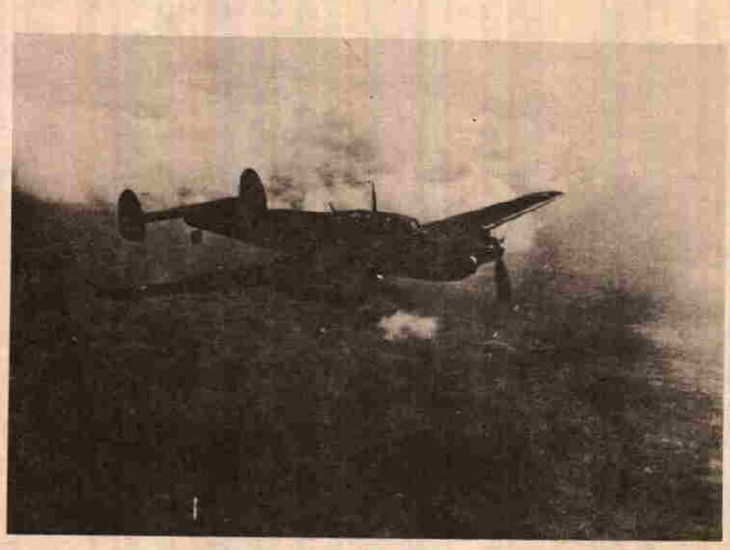
Me-210's in Russia, 9 Sept. 1942

Dornier 15 (Do-15)

THIS PAGE DECLASSIFIED IAW EO12958



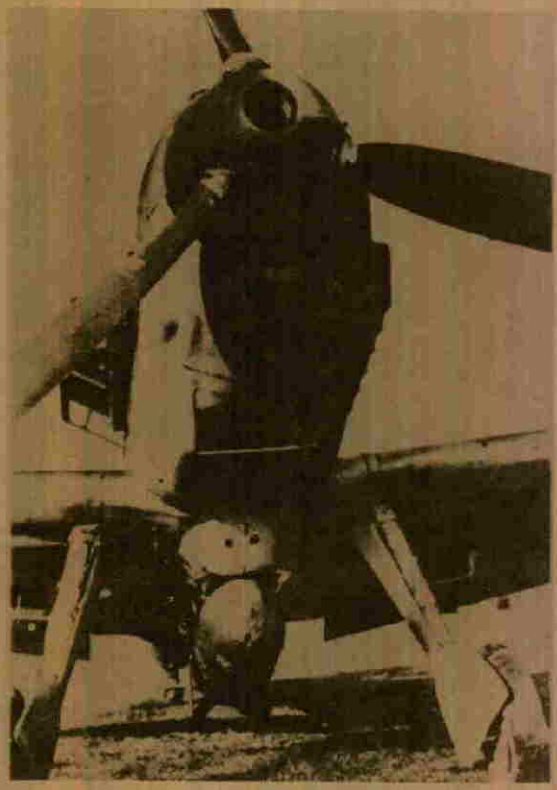
Henschel 129B (Hs-129B) Ground Attack Aircraft



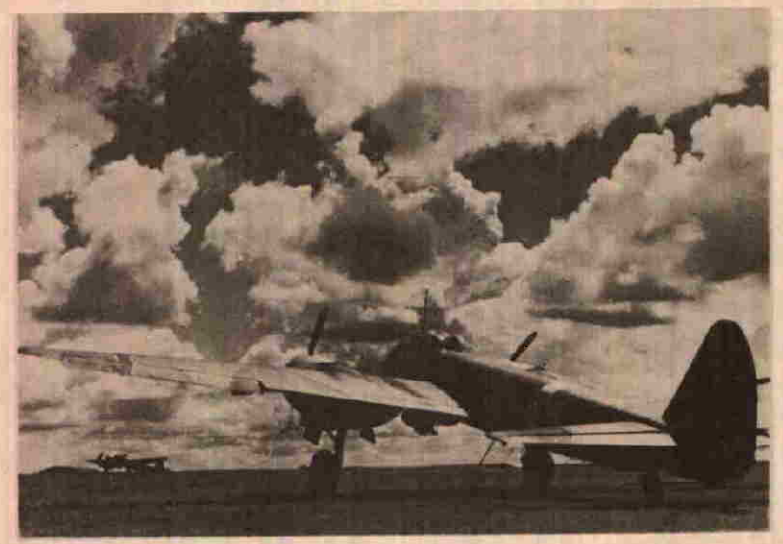
Me-110

THIS PAGE DECLASSIFIED IAW EO12958

Ju-87's at approximate maximum dive angle



Me-109 equipped as a Jabo (fighter-bomber)

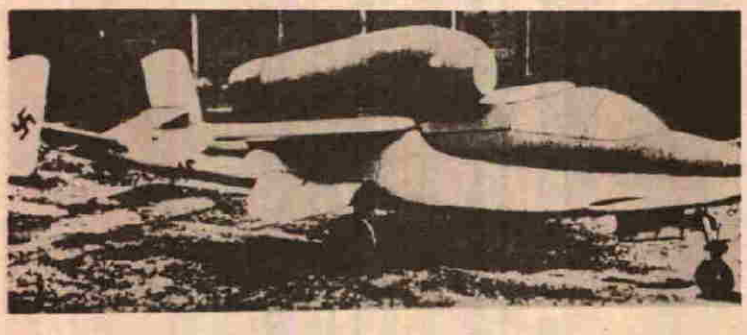


Ju-88C

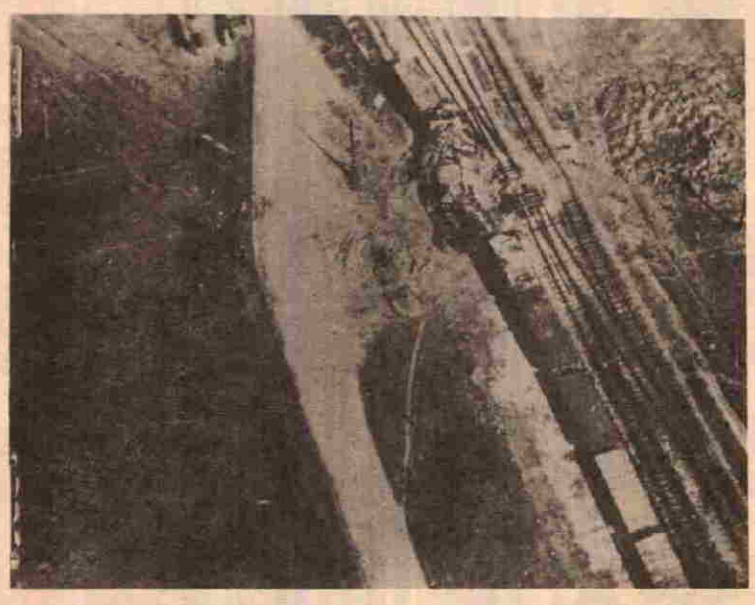
Arado 234

He-70

Do-17P

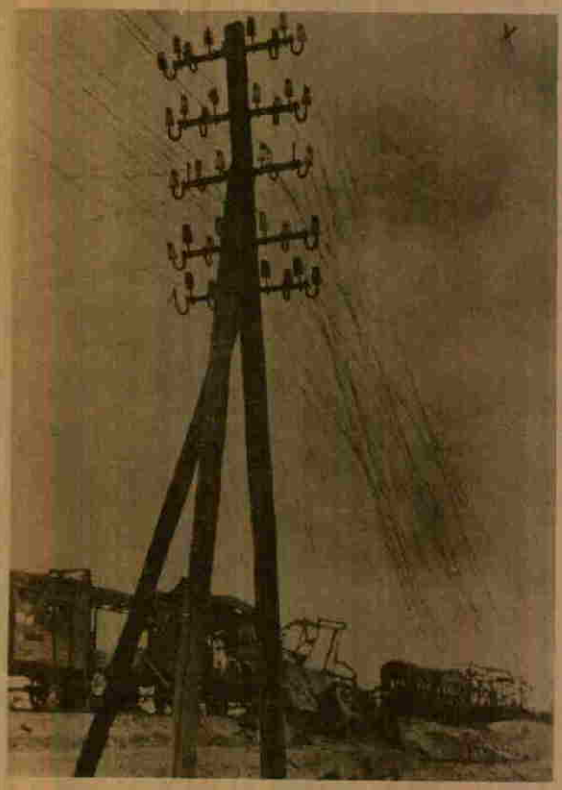


Heinkel 162 (He-162)

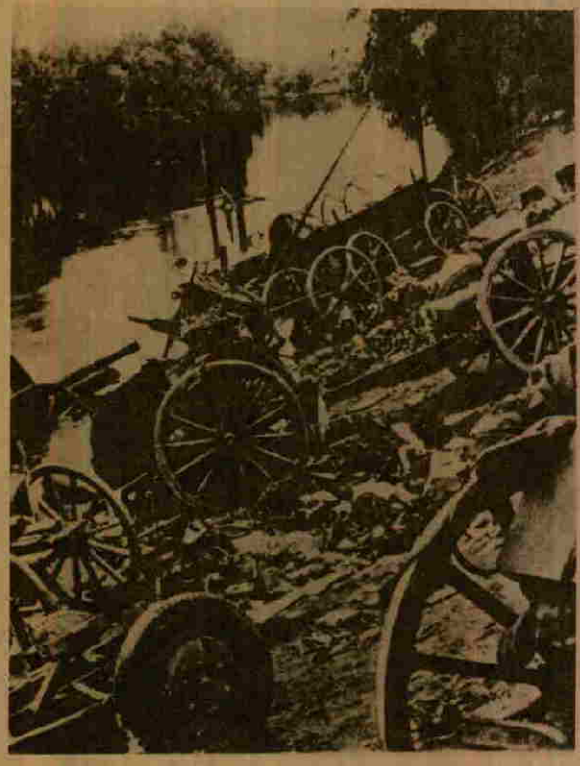


Stuka Attack on Railroad, Poland, 1939

THIS PAGE DECLASSIFIED IAW EO12958

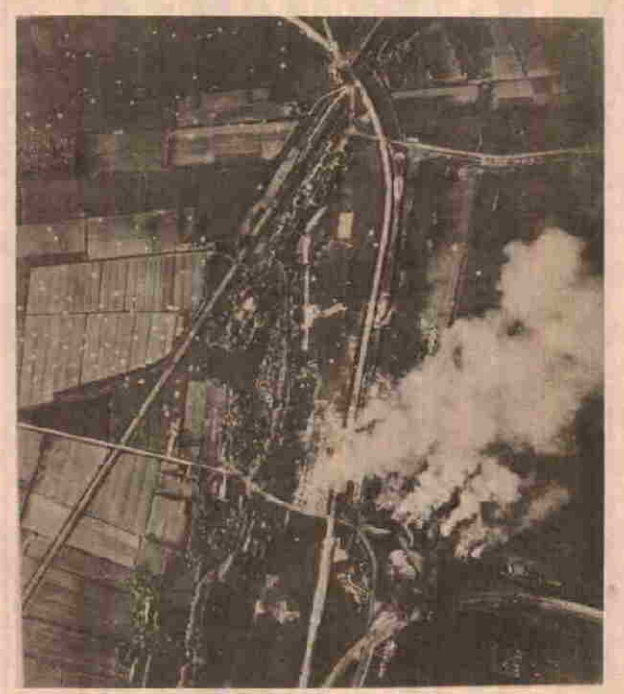


Attack on Rolling Stock, Poland, 1939



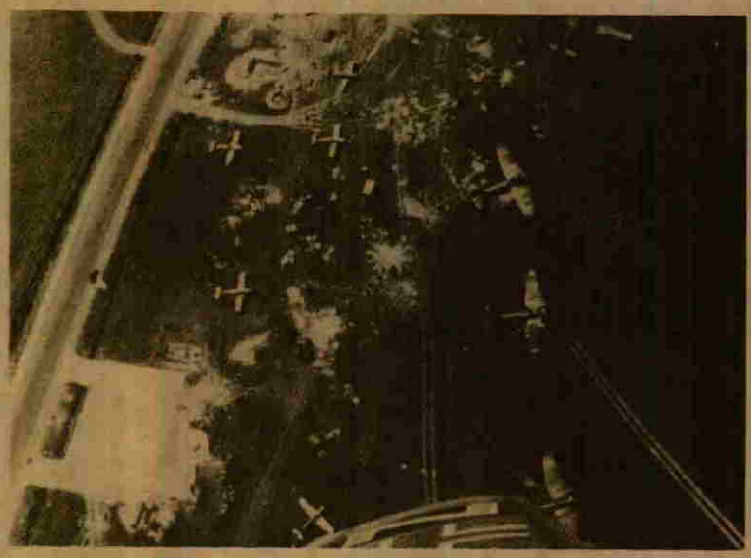
Interdiction of the battlefield by Stuka's, Poland, 1939

Bunker destroyed by gunfire and Ju-88's,
Campaign in France, 1940

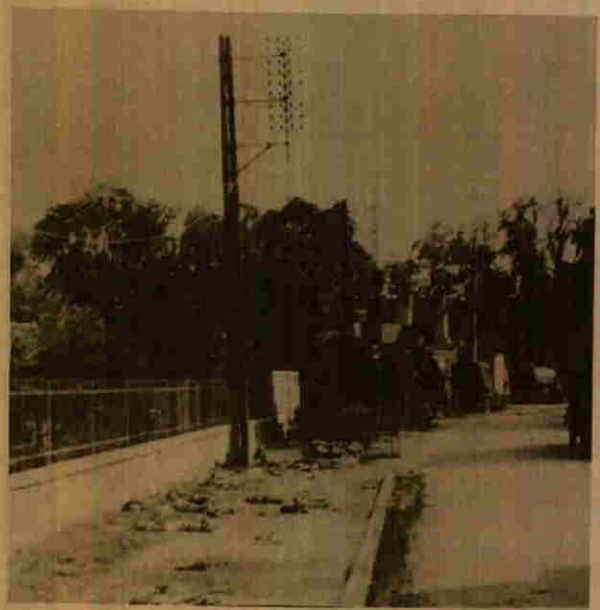


Rotterdam-Waalhaven airport, burning
and under attack by paratroopers, 1940

THIS PAGE DECLASSIFIED IAW EO12958

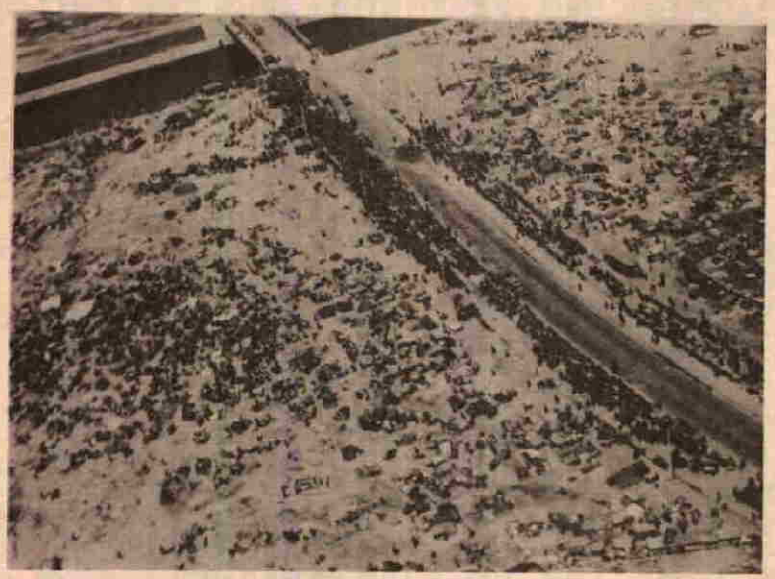


Attack on French Airfield, 1940

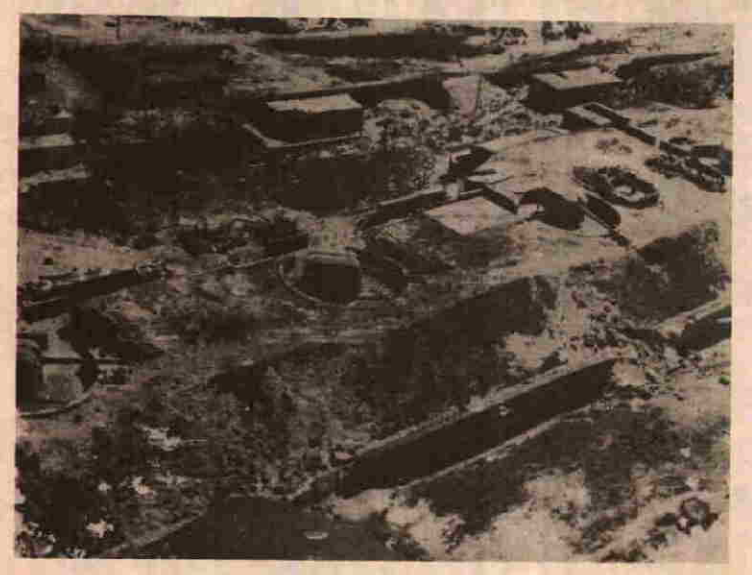


Attack on enemy column, Campaign in France, 1940

THIS PAGE DECLASSIFIED IAW EO12958



Dunkirk, 1940



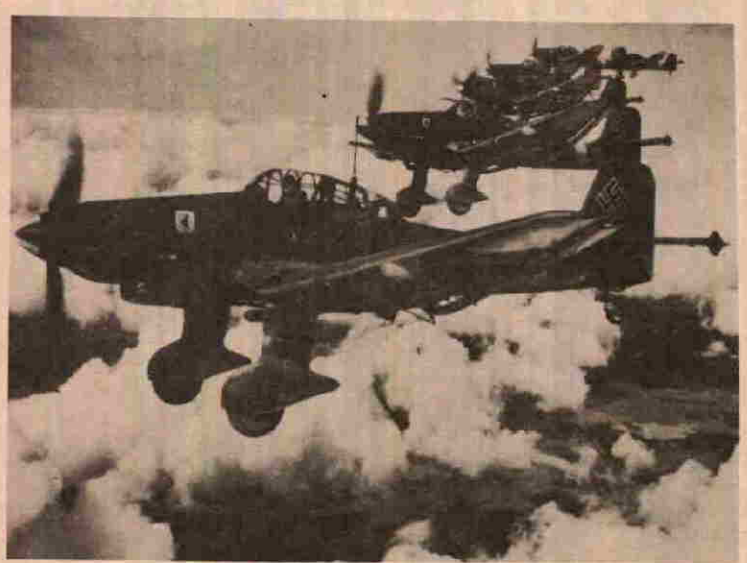
French coastal battery after attack, 1940

THIS PAGE DECLASSIFIED IAW EO12958

Stuka Attack, Campaign in the West, 1940

Bunker destroyed by gunfire and aircraft,
Campaign in France, 1940

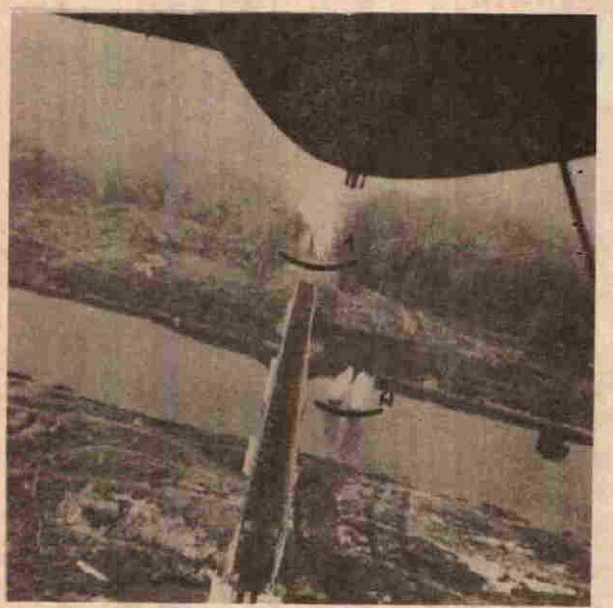
Interdiction of the battlefield, encirclement battle of Kiev, 1941



Stuka's returning from mission, Battle of Orel, 1941

THIS PAGE DECLASSIFIED IAW EO12958

Air Photo Showing Result of Destruction of a Bridge
During Encirclement Battle of Smolensk (1941)



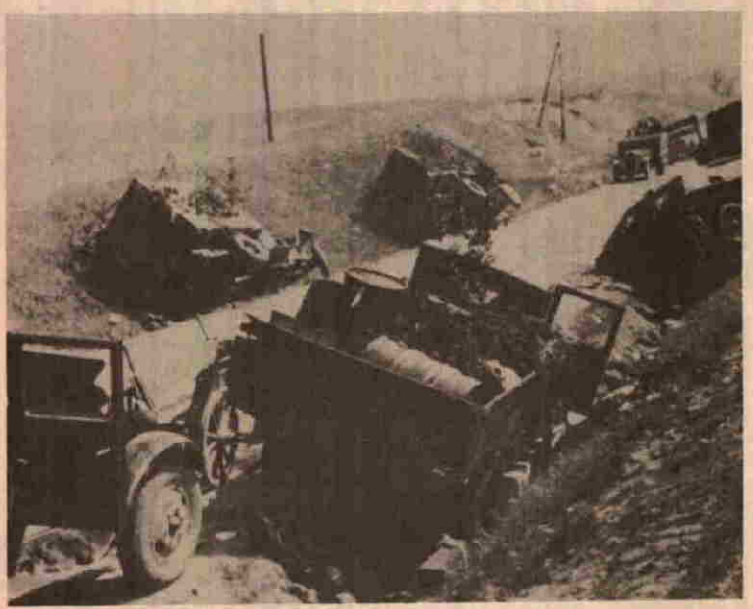
Attack on railway bridge near Millerovo
by 54th Bomber Wing, 30 Sept. 1941

Result of Attack on Russian Antiaircraft Guns, Kiev, 1941

THIS PAGE DECLASSIFIED IAW EO12958

Russian prisoners, Encirclement Battle of Kiev, 1941

Russian tanks destroyed by the Luftwaffe



Result of Luftwaffe Attack on Russian Supply Column in First Weeks of the War, 1941

Stuka Attack, II Air Corps, on Airfield at Kobrin, 1941

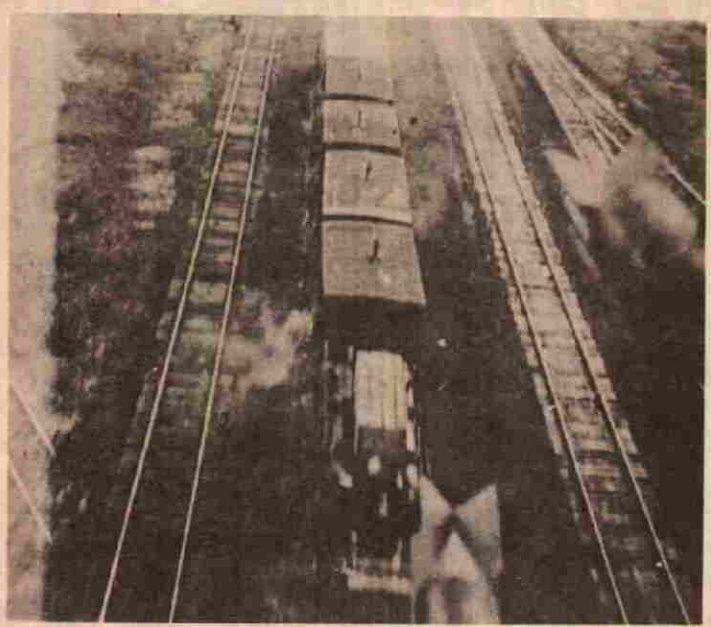
THIS PAGE DECLASSIFIED IAW EO12958

Air Attack on Russian Motorized Column,
Encirclement Battle of Bryansk, 1941

Air Attack on Railroad Station and Yards, Volokolamsk,
by 3d Bomber Wing, II Air Corps, 22 Sept. 1942

THIS PAGE DECLASSIFIED IAW EO12958

Direct Hit on Ammunition Dump Near Rzhev, 26 Sept. 1942



Bombs Falling on Moving Train, 54th Bomber Wing,
30 Sept. 1941

THIS PAGE DECLASSIFIED IAW EO12958

Chapter 4

OPERATIONS OF COMBAT AIR FORCES

Air Defense of the Army: Supply System and Power Resources

As a rule, air defense did not constitute a separate mission. Under normal circumstances it was bound up with the mission which had to be accomplished in order to secure air supremacy or at least temporary and local air superiority. As early as 1935 Air Field Manual No. 16, in paragraph 103, had described action against enemy air forces with the object of achieving air superiority as the primary mission of airpower throughout the whole duration of a war:

> Combat action against enemy air forces must be taken from the very beginning of a war. Neutralization of enemy air power weakens the whole military power of the enemy, and serves to protect the friendly military forces, the civilian population, and the country. It also releases aggressive friendly air forces for the execution of other missions which are of vital military importance.

In a critique marking the close of a command and general staff field exercise in June 1939 General Hans Jeschonnek, Chief of the Luftwaffe General Staff, emphasized that defeat of the enemy air forces must initially be the main objective of the Luftwaffe; hence, the forces participating in the first attack must be as strong as possible. The mission of providing air support for the army forces, he went on, was not as important in the first few days of a war as the mission of counter-air action. "The damage which can be inflicted on a hostile army in the first two days of a war" Jeschonnek observed, "is in no way proportionate to the damage an enemy air force can inflict if it remains completely operable."[1] Early in the Allied invasion of Normandy (1944), Hitler, speaking from German experience, stated that air superiority was vital. It was more decisive in warfare, he remarked, than any other single factor, since air superiority gives almost complete freedom of movement, while its lack leads to immobility. Indeed, Air Field Manual No. 16 described counterair action against the enemy air forces as action in support of the Army (paragraph 121).

It was a fundamental necessity prior to the commencement of each campaign to examine whether the Luftwaffe had a sufficiently large superiority to commit certain forces in army support missions immediately the campaign began, or whether all forces available would be required initially for combat action against the enemy air forces. After the Allies had built up their air forces to a strength which placed the maintenance or establishment of German air supremacy or general superiority completely outside the realms of possibility, the Luftwaffe found itself compelled to restrict its efforts to the establishment of at least temporary and local superiority over the zones of army operations. When even this was no longer possible in combat against the Western Allies, first in Italy, and, later, in France after the invasion, the operations of the German ground forces inevitably also had to fail.

Forces for the protection of the Army from enemy air attack were dispersed among the major Army components. As a rule a fighter wing of three or four groups was assigned in the command zone of each army group. This group was under command of the air fleet of air corps headquarters responsible for air operations in the zone. During friendly or enemy offensives, or when the air situation was critical, these forces if at all possible received temporarily assigned reinforcements. From 1943 on, however, this was as a rule only possible at the expense of other segments of the front which had to be stripped of forces for the purpose.

The sketch "Air Defense Forces in the Eastern Theater on 26 March 1944"* (Die Luftverteidigungskraefte an der Ostfront am 26. 3. 44) shows the strength and disposition of the German fighter forces available in the eastern theater on that date. The figures show that the forces thus available definitely must be considered as having been inadequate considering the recovery made by the Russian air forces and in view of the long frontages involved. However, the home air defense situation made it impossible to allocate reinforcements to the eastern theater. Another circumstance that imposed a constant drain on the fighter forces in the eastern theater was that combat action in the east was considered as a training mission. The majority of the fighter pilots committed in the theater were transferred

* See Appendix 2.

to fighter units committed in home defense as soon as they had enough combat experience, and were replaced by newly trained fighter pilots without combat experience.

Luftwaffe tactical principles of air defense as a rule provided for fighter aircraft to go into action from a scramble takeoff the moment enemy air forces were reported approaching. For this purpose a certain percentage of each unit was held ready for immediate action under what was called a "seated alert" (Sitzbereitschaft); other pilots were under normal alert. As a rule rest periods could only be granted during the dark of night or during spells of bad weather.

German regulations rejected the idea of maintaining constant fighter patrols in the air over or in front of the main line of resistance. It was only during offensive operations that the armored units spearheading a drive on the ground were given more or less continuous fighter protection. The same fighter units were also employed, when necessary, to provide escort protection for attacking German bomber forces, or were required to establish air superiority over the current target area during a bombing mission.

One problem which practically defied solution was that of adequate action against Russian ground attack air units, which made up the bulk of the aggressive branch of Russian air forces. These aircraft approached the front at low altitudes in squadron strength (varying between three and eight aircraft) to attack the forward German positions, returning immediately to Russian territory. Even when going into action in a scramble takeoff the German fighters usually arrived too late for counteraction because the radar instruments failed to detect planes approaching at low levels. Pursuit over Russian territory was usually a fruitless endeavor, since the Russian planes flew too low for air combat. Furthermore, they had protective armor plating and therefore were difficult to shoot down. German fighters which did attack came under intense defensive fire from the ground. The only practicable remedy for this problem was for the troops to protect themselves by their own defensive fire and by going into cover. As a rule the damage done in these attacks was very small.

In spite of the deficiencies outlined above, the German fighter forces in the eastern theater acquitted themselves quite well in the

accomplishment of their mission of protecting the ground forces and their installations against air attack. This was possible primarily because of the superior quality of German flying personnel and German aircraft. The best evidence of this was to be found in the rail and road traffic behind the German and Russian front lines. Except during major offensives the roads and rail routes behind the Russian lines were completely quiet during daylight, while on the German side traffic proceeded on road and rail routes almost without hindrance. Matters were naturally different in other theaters of operations, where the German fighter defense was practically neutralized by the superior aircraft available to the enemy.

Types and Scope of Air Support

It is in the nature of airpower that more profitable results can be achieved in attacks against large, compact targets than in attacks against small targets within the battle area. The latter as a rule were widely separated, and usually were dug into the ground to protect them against artillery fire. Even during mobile operations, however, moving targets within the near front areas frequently were found only in widely dispersed order, and took every opportunity to seek any cover the terrain offered.

Another factor which had to be taken into account was that the enemy concentrated the bulk of all weapons in the areas near the front, and a large percentage of these weapons could be brought to bear against aircraft. This was particularly so because the small size of the targets under air attack compelled the German aircraft to operate at low levels. The outcome was that heavier aircraft losses were incurred in these operations, some of them shot down and permanently lost, some of them rendered inoperable for a considerable time because of extensive damage.

The two air photos attached as Appendixes 3 and 4 show a tank factory and tanks operating in dispersed order on a field of battle, and clearly reveal the type of target against which an air attack could produce the most profitable results. In a tank battle, even if heavy commitments of German aircraft (operating in the area of main enemy defense and at a correspondingly heavy loss) succeeded in destroying all of the tanks, the factory shown in Appendix 4 would

have produced enough tanks in one day to make up the loss. An attack resulting in destruction of the tank factory, or putting it out of operation for any length of time, would reduce the enemy output in tanks by numbers which represented a multiple of the tanks which could have been destroyed individually in the terrain.

Therefore, Air Field Manual No. 16 established in paragraph 120 that "Within the scope of the overall conduct of the war, combat action by air forces will generally provide indirect support for the combat operations of the other military services." It was obvious that this indirect support would only become evident after some time, but that it then could become evident in a decisively important form, having as a rule an impact all along the line and not restricted to any specific segment of the front. However, decisively important operations on the ground were often designed to produce more speedily effective results, which might remain restricted to specific areas. The German air field manual therefore provided in paragraph 121 for more speedily effective direct army support in certain circumstances, support in the form of operations directly coordinated with those of the Army on the ground.

According to paragraph 20 of the manual, operations in direct support of the Army were of more urgent necessity than were actions against distant targets when the operations to be supported were "of decisive importance within the scope of the overall conduct of the war." Expressed in different words, this is the same principle formulated in World War I, that is, "The aim must be to insure that no decision is forced in combat without the Luftwaffe making its full contribution."

The object of the following passages is to closely examine this direct cooperation between the Luftwaffe and the Army in operations of decisive importance and to examine the prerequisites for such cooperation together with the manner in which it was accomplished. In such an examination two methods become apparent for the execution of the direct support or direct cooperation mission, as outlined above, namely, 1) Air action against enemy transportation movements and communications, the object of which is to isolate the battle area; and 2) air action against targets in an area closer to the front line, described as tactical or close air support. As a rule German air forces supporting the Army ground forces during operations designed to force a decision on the ground applied both methods--combined in

timing but divided in place.

The combination of the two methods of army air support was applied as early as the Polish campaign, and was used with great success during the 1940 campaign in France. This same method, which during the initial years of the war formed an integral part of the whole Blitz war concept, also played a decisive role in later phases of the war. A few examples (which could be added to considerably), such as the 1941 battle at Kiev,* or the capture of the Russian fortress of Sevastopol,/ serve to show how these two methods were always applied simultaneously and in combination.

Among other factors, this was in part the result of technological reasons. Thanks to high maneuverability, the single-engine dive-bomber and ground-attack aircraft were the only types which could be committed in close army support missions on the field of battle without incurring the risk of insupportably heavy losses. However, conditions were frequently such that the striking range of these types of aircraft was inadequate to permit their use in action in the enemy rear designed to seal off the battle area. Conversely, the multi-engine types of bomber aircraft were not suitable for commitment in close support action within the battle area.

Another tactical effect which was achieved by this combination was that enemy elements which succeeded in passing through the interdiction belt unharmed, a thing which was bound to happen, again found themselves threatened by destruction through air attack within the battle area. In addition, this type of operation coincided with the tactical principle that once a target is taken under attack, the attack should continue until the target is destroyed.

---

* Editor's Note: One of the seven great battles of encirclement during 1941.

/ Editor's Note: For a detailed and interesting account of the capture of Sevastopol, see Field Marshal Erich von Manstein, Lost Victories (Chicago, 1958), pp. 222-259; also, "Das VIII Fliegerkorps im Einsatz Sewastopol 1942 (Juni)" (The VIII Air Corps in the Operations at Sevastopol, June 1942), from a study the 8th Section, Luftwaffe General Staff: "Experience of the Luftwaffe in Operations Against Fortresses." Karlsruhe Document Collection, F III 1.

Although the two forms of direct army support were thus as a rule applied in combination, they will nevertheless herein be treated separately, inasmuch as each form had to be applied in accordance with separate principles. Since the operations were separate in area, it is possible to examine them separately.

On the basis of operational plans or acting on requests by the Army High Command, the Wehrmacht High Command in each case issued directives to the Commander in Chief of the Luftwaffe governing air support to be given to the Army.* In accordance with the basic directives thus received, the Commander in Chief of the Luftwaffe coordinated the mission of Army support with the other missions of the Luftwaffe and reached appropriate agreements with the Army High Command.

Based on these agreements an appropriate order was issued to the air fleet headquarters responsible for air operations in the areas involved and, if necessary, the air fleet was assigned the appropriate forces for the purpose. In agreement with the army group to be supported, the air fleet then issued the necessary orders to the air corps or air division responsible for the commitment of the air forces involved.

Normally, the Wehrmacht High Command did not decide whether the army support operations were to take the form of interdiction action to seal off the battle area or of direct air combat action within the battle area. The decision was to be reached in agreement between the lower level commands concerned. On this subject Colonel Kusserow, who served for a long time as Chief of the Air Operations Section of the Luftwaffe Operations Staff at headquarters of the Luftwaffe High Command,/ wrote in a report dated 2 September 1954:[2]

> Practical experience in the preceding campaigns had proved that in this respect direct cooperation between the two locally responsible commands on the spot in the battle area

---

* See Appendix 12.

/ Editor's Note: Colonel Ernst Kusserow held this post from March 1941 to the summer of 1943.

produced the best results, better than those /which/ a control from some higher headquarters over the air forces involved could produce. The zones of the air fleets coincided with those of the army groups.

Concerning the allocation of the necessary units to the air fleet headquarters, Colonel Kusserow observed that allocation of air forces was dependent on the missions of the individual army groups. The point of main effort in Army operations at the beginning of the campaign was also the area of the main concentration of airpower.

Interdiction of the Battlefield

The German air command realized at an early stage that during large-scale army operations on the ground air action to prevent enemy movements to the front represented a highly effective means to influence the course of combat operations. Large-scale operations on the ground necessitated a continuous flow of gigantic masses of personnel and materiel to sustain combat action. These personnel and this materiel had to be moved forward from the enemy training areas and armament factories, usually situated far in the rear. Interdiction of these replacement movements normally had an impact on combat action at the front within a few days. The larger size of the targets for air attack here insured more profitable results than attacks against the dispersed targets which could be found in the battle area.

The views of the Luftwaffe High Command on this problem are formulated in paragraphs 129 and 161 of Air Field Manual No. 16. The manual asserted that the closer the decision in battle, the greater would be the effect of bomber attacks against targets on and near the front. Targets attacked in the enemy rear would disrupt enemy supply installations and impede the forward movement of replacements. It would be essential also, the manual continued, to assign vitally important targets, commensurate with the decisive nature of airpower.

As a rule German air action against enemy rear communications were designed to weaken the enemy and to create favorable conditions for German operations or to influence such German

operations. Nevertheless, the objectives aimed at in such action varied in accordance with the current situation. At the beginning of a war or during mobile operations it was possible to assign the Luftwaffe the mission of preventing enemy forces from reaching certain areas or phase lines in time. This gave the German troops an opportunity to reach these areas or phase lines and occupy them before the arrival of the enemy. Prior to or at the beginning of a decisively important offensive it was possible to assign the Luftwaffe the mission of so weakening the enemy through attacks against their rear communications that operations would proceed favorably for the German side. On the other hand, if the enemy were preparing to stage an offensive, the mission of the Luftwaffe might be to take action which might prevent the offensive altogether, or at least to so weaken the enemy forces that the German forces on line would be able to repel the attack.

Another task, which became an almost permanent mission of the German air forces in the eastern theater because of the weakness of the German ground forces there during the later phases of the war, was to influence the strength ratios in favor of the German side, either temporarily or permanently. This was designed to gain time for an increase in German strength, or to prevent the arrival of further enemy reinforcements and thus avert the possibility of the enemy achieving an overwhelming numerical superiority. In some cases, on the other hand, the air mission was to prevent the departure of enemy forces from specific areas. The necessity could arise when the enemy planned the movement of personnel and materiel from certain areas during successful German operations in order to prevent their envelopment or destruction, or in order to use them for the establishment of a defense or support line in the line of advance of a German shock force. Interdiction missions were also necessary in situations where the enemy intended to move materiel and personnel from one segment of the front to another for offensive or defensive purposes.

Air Field Manual No. 16, in paragraphs 162-177, established certain principles to be observed by the various field commands of the Luftwaffe in action designed to interdict troop transportation

routes.* Troops and supplies could be moved forward by the following means: cross-country marches on foot; truck transportation on roads; rail movements; in special circumstances by ships using inland or other waterways. And the mission of the air forces was either to destroy the means of transportation or to interrupt the transportation routes.

---

* Editor's Note: The substance of paragraphs 162-177 provided that in the circumstances of enemy concentration and regroupment, operations against transportation networks must be in close cooperation with the Army. Combat operations against troop concentration and other troop movements must be primarily a rail interdiction mission. A key factor is proper timing. The fact that part of the movement can occur by road and across country reduces the time available for attack. Exploitation of the hours of darkness makes timely detection and attack a difficult matter. Valuable results may be achieved through attacks against particularly important and large structures; targets of this type include river bridges, viaducts, and tunnels. Timely recognition of a movement is possible only if all intelligence sources are fully exploited, and if constant air reconnaissance is maintained. If signs of a movement multiply, air reconnaissance must be employed to the utmost. Lack of night air reconnaissance must be compensated by early morning and late evening missions. In urgent situations, air photo reconnaissance and interpretation must be complemented by visual observation and, in certain cases, by radio. Important factors of success are (a) In troop concentration movements, the distance behind the enemy lines at which railroads are destroyed, (b) In regrouping movements, the distance from enemy unloading points at which railroads are destroyed. The attacks must interdict the entire movement, without any possibilities to reroute it. Particularly effective results can be obtained through the destruction of structures at points on which routes of the rail network converge. Destruction of the rail lines between rail depots is usually more easily achieved but less effective. In general, rail depots and rail junctions should not be targets for interdiction attacks. Attacks against moving railway trains, however, are effective. Generally speaking, attacks against loading and unloading operations do not offer prospects of success of an operational magnitude. The results achieved in attacks on roads can at no time reach the scope of those against the rail system.

In order to achieve such a program of interdiction, Air Field Manual No. 16 also laid down categories of targets. The principal categories were: 1) All types of moving columns and march movements; 2) troop concentrations; 3) rail interdiction targets (including rolling stock and permanent installations); 4) road interdiction targets; 5) waterway interdiction targets; 6) man-made structures; and 7) port installations. Because of the large number of targets, a careful selection was necessary. Thus, the air field manual mentioned that it is essential to determine the vitally important targets.

In order to be able to assure success in operations designed to seal off the battlefield, precise information had to be available concerning the scope and capabilities of the transportation means and transportation system available to the enemy. It goes without saying that the conditions were fundamentally different in the case of each country with which Germany came into conflict.

The necessary information concerning all permanent installations and structures, particularly those of the transportation and communications networks, had to be procured during peacetime. All such data was compiled in a separate volume of the "Military-Geographical Description" (Militaergeographische Beschreibungen) for each country. Volumes of the descriptions were available for a number of countries, including France, Russia, North Africa. Some of the volumes were compiled in great detail and included, for example, tables showing all man-made structures, their location, construction, and vulnerability to destruction. *

Another valuable source of information was available in the rail routes and road routes maps published by the Army Transportation Division. These maps showed all rail and road routes in a country together with their carrying capacities.

After the outbreak of war the data thus available had to be supplemented continuously by information secured through other intelligence media, such as air reconnaissance, agents' reports, and prisoner interrogation. The information available was subject

* A specimen is extant in Appendix 9, unpublished appendices of USAF Historical Study No. 163. Karlsruhe Document Collection.

to frequent changes and modifications due to developments in the military situation and other causes. Thus, the delivery of 427,284 American trucks to Russia[3] produced a pronounced change in the Russian transportation system.

On the basis of available data, together with a knowledge of intended German conduct of operations in the event of war, it was often possible even before the war to prepare plans for air operations to interdict an enemy transportation system. Thus the "Instructions for the Strategic Assembly and the Conduct of Combat Operations" (Aufmarsch-und Kampfanweisung) prepared by the Luftwaffe General Staff against the eventuality of war provided for action to sever enemy communications. The instructions were issued for the first time in 1936 and were to apply in the event of war against an adjacent country. For purposes of concealment the instructions from 1938 on were issued as Tactical Problem White, Red, etc. (Planstudie Weiss, Rot, etc.), a separate color being used to designate each country.

The plans contained in these studies for action to interdict transportation routes were worked out in collaboration with the Army and with support from the Transportation Division of the Army General Staff as the best informed expert on the transportation systems in possible future enemy countries. A plan of this type was prepared against the eventuality of armed conflict against Poland.* In the French campaign, operational directives to the Second Air Fleet stated the most favorable points for interdiction attacks designed to prevent road transportation movements in France.†

It is only natural that precautionary planning of this nature for action to interdict the transportation system could not be restricted to rail routes alone but had to include plans for action against all roads which were of importance in the conduct of military operations,

---

* Appendix 10 in unpublished appendices of USAF Historical Study No. 163, Karlsruhe Document Collection, consists of the rail route map of the plan. Those rail routes are lightly shaded which were to be interdicted by the Luftwaffe in the event of war against Poland.

† An example is extant in Appendix 11 in unpublished appendices of USAF Historical Study No. 163. Karlsruhe Document Collection.

whether it was likely that the potential enemy would use the roads for military transportation from the outset or might be compelled to shift emphasis in transportation to the roads after their important rail routes were destroyed. Plans were thus prepared during peace for the destruction of important roads in the event of war. Throughout the war similar traffic interdiction plans were prepared and put into effect at airfleet-army group, airfleet-army, and higher levels of command.

The decision to seal off a battle area could be taken by the Wehrmacht High Command, which could issue the necessary orders. It could be taken in response to a request from the Army High Command. If the area to be sealed off did not exceed the zone of operations of an army group or of an army, the decision was usually taken at the airfleet-army group, airfleet-army, or air corps-army level of command.* This presupposed that the air and army commands concerned had received the appropriate instructions from the Wehrmacht High Command or the Luftwaffe High Command to cooperate.

The mission was executed by the command headquarters responsible for the control of the air forces within the area concerned. As a rule this was an air corps or air division or, in exceptional circumstances, a local air command headquarters. The commanding Luftwaffe officer controlling the flying forces involved was solely responsible for the methods employed in the execution of his mission. According to paragraph 125 of Air Field Manual No. 16 the commanding officer directing the operations of the ground forces had to restrict himself to "stating the purpose to be achieved by the operations of the Luftwaffe." In the event of diverging opinions (which was a rare occurrence) the decision was made by the next superior headquarters.

This arrangement insured that the execution of air combat missions would be handled exclusively by officers of the Luftwaffe with the appropriate training, who were responsible for the proper application of the operational and tactical principles of the Luftwaffe. In this respect the Luftwaffe commanding officer was responsible for proper observance of the principle established in paragraph 13 of

---

* See Appendix 12.

Air Field Manual No. 16 that "too frequent changes in the objective, which would prevent achievement of the maximum effects in the action, will not take place."

Before the officer directing the army operations on the ground stated the purposes to be achieved in the air action, he usually conferred with the officer directing the air operations or with liaison personnel from that officer's staff. This was the only way to insure that due consideration would be given to the capabilities of the air units available, and that the mission assignment would not state requirements which the air command could not fulfill because of the forces available to it and because of the limited range of its aircraft.

The mission assignment from the officer directing the army operations on the ground to the officer directing the air action was then formulated and, as a rule, contained the following points in a form more or less as follows:

> 1) The purpose of the action is to prevent enemy columns of all types crossing a line extending from A through B and C and farther westward--or--2) The purpose of the action is to interdict the rail routes from A to B, C-D, and E-F in order to prevent enemy transportation movements for a period if at all possible of four to five days.

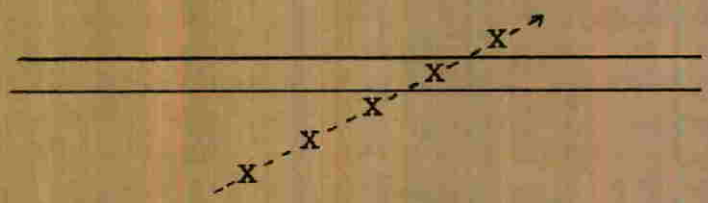
For operations to seal off a battle area the responsible air command had available its assigned bomber forces, and during the first phases of the war its dive-bomber units, insofar as their operating range was adequate for the purpose. The dive-bomber units were particularly suitable for attacks designed to destroy point targets. Fighter units escorted the bomber and dive-bomber forces, both of which were extremely vulnerable to attack by enemy fighters. After executing their escort mission, or if the German side had air superiority in the area involved, the fighters attacked ground targets with weapons fire.

Basically, the execution of attacks against moving enemy columns and transportation routes did not differ widely from the methods employed in attacking other similar targets. As a rule the attacking units operated at intermediate altitudes. Aircraft capable of diving carried out their mission in dive-bombing attacks. This

applied to the Ju-88 and the Ju-87 type of aircraft, although Ju-88 units at times did their bombing while in a glide. If the air situation permitted, the units carried out low-level attacks, which greatly increased the effectiveness of the attack. Indeed, as Air Manual No. 16 observed, the effect on the morale of the enemy troops of low-level attacks on troop movements, "will often exceed the actual damage done." In general, the manual continued, bomber forces are not suitable for low-level attacks, but at the climax of a battle it might be advisable to throw all available units into the balance. If losses in this type of action are to be kept within tolerable limits, the manual insisted that the action achieve surprise.

In 1941, after the resounding successes of the Luftwaffe in its operations against the Russian air forces had created conditions which made such action possible, great success was achieved by sending out flights of only two or three aircraft carrying bombs on what were called armed reconnaissance missions. These small units were more easily maneuvered and were more flexible in their operations than larger units, and also could attack targets which would hardly have been worthwhile for larger units. Later, because of the more critical air situation, missions of this type could be carried out only by fighter bombers, with their smaller operating range. Planes on armed reconnaissance missions were also able to search out railway trains travelling alone or placed under cover in dense forests, or, if on early morning missions, to detect the tail end of night troop movements and take them under attack.

What complicated attack action against the type of target usually encountered in operations to seal off a battle area was that, except in the case of troop concentrations, the targets were generally very narrow but at the same time long. A special bombing pattern was developed for attacks against rail tracks, a particularly narrow type of target. The attacking plane approached the rail tracks at a sharp angle and dropped its bombs at short intervals in a stick-bombing run. In this method of bombing it was highly probable that at least one bomb would strike the permanent way directly or would detonate close enough to damage it by fragments.



Bomb release run ------
Bomb release points X

In attacks with nose-spiked bombs, the planes had to operate at a low altitude. For this reason these attacks were often carried out against rail routes between depots, where defense fire from the ground was not likely to be very heavy.

The first condition for the successful accomplishment of a bombing mission was very close collaboration between the air reconnaissance units on the one hand and the bomber and other units on the other, except in the case of planes on armed reconnaissance missions, which searched out their own targets. Usually the command held bomber units under alert and ready to take off immediately to attack any target the moment reconnaissance planes located and reported any such target by radio.

In special circumstances it was sometimes found necessary to protect bomber units engaged on combat missions, either by means of direct fighter escorts or by means of fighters committed in roving missions within the target zone.

Numerous case studies of action by German air units in sealing off battle areas in the Second World War are available for all campaigns and theaters. For the Polish campaign, a study prepared during the war by the Military Science (8th) Branch of the Luftwaffe General Staff reveals that as a result of early and efficient air attacks against the railroads, the Poles were able to bring into battle only 37 infantry divisions, 11 cavalry and 7 border guard brigades, out of a total of 45 infantry divisions, 16 cavalry and 10 border guard brigades which had been mobilized.

A report by the Military History Branch of the Luftwaffe

provides a graphic description of Luftwaffe participation in ground combat by means of air operations to seal off the battle area. During the Battle of the Radom Pocket* the Luftwaffe completely halted rail and road traffic in northern and eastern Poland, making it impossible for the Poles to form a task force at Kielce. By 8 September the German Air Force had succeeded in bringing to a complete halt all traffic on the major routes Poznan-Kutno-Warsaw, Krakow-Radom-Deblin, and Krakow-Tarnow-Lvov, and all communicating roads. The rail routes were blocked by destroying depots, rails, and trains. As a result the Polish forces were driven from the rail routes and headed eastward on the roads. But by continuous attacks on the latter the Luftwaffe prevented an orderly retreat and the establishment of a line of resistance west of the Vistula River.[1] The success of the above air operations is substantiated by a report of General Kutrzeba, in command of the Polish Army of Poznan:

> Towards 1000 hours the enemy commenced vigorous air attacks against the bridges of Vitkovice.
>
> In point of the number of aircraft committed, the severity of the individual strikes, and the acrobatic daring displayed, the /enemy air operation/ represented a record.
>
> Every movement, every troop concentration, and all march routes were taken under annihilating fire from the air . . . . It was Hell come to Earth. The bridges were destroyed, the fords were blocked, the antiaircraft and part of the other artillery forces were annihilated . . . . Continuation of the battle would have been nothing but a matter of holding out, and to have remained in position would have posed the imminent threat that the German air forces would have turned the whole place into a graveyard, since antiaircraft defenses in any form were completely lacking.

---

* Editor's Note: Reference is to the Tenth Army's breakthrough to the Vistula and the battle of the Radom Pocket, in which large Polish forces were effectively encircled by 12 September, resulting in the capture of 60,000 prisoners and 130 guns.

[1] "Der Feldzug in Polen in Stichworten" (The Polish Campaign in Brief), Records of Historical Division (8), Luftwaffe General Staff. Karlsruhe Document Collection, G III 2C.

The above presentation by a Polish general commanding an army can undoubtedly be accepted as proof of the decisive nature of the contribution made by the Luftwaffe through its participation in operations on the ground towards the German victory over Poland.

In the 1940 campaign in France German air power was also committed extensively in combat action against the enemy rear communications and in action to seal off battle areas. In the first few days of the campaign, for example, large elements of the air forces under the Third Air Fleet attacked French rear communications as far back as a line from Givet through Hirson, Laon, Rheims, Sainte-Menehould to Verdun, with main emphasis on the area before Charleville-Sedan. As soon as German air superiority had been securely established, air attacks to an average depth of 48 miles behind the enemy lines struck moving troop columns, troop concentrations, and rail routes. [4]

Situation reports of the Intelligence Division, Luftwaffe General Staff, for 15 and 16 May, gave an account of operations of Third Air Fleet to seal off the battle areas. The units of the air fleet were employed in continuous attacks supporting ground operations of the Army in the Fumay-Chalons-sur-Marne-Revigny-sur-Ornain-Metz-Longuyon area. In the Charleville-Stenay area, west of the Meuse River, strong forces from the air fleet attacked moving troop columns, troop concentrations, fortifications, and traffic routes. Single- and twin-engine fighter units were committed in escort missions and in action to maintain air superiority and in the Sedan-Charleville area alone 69 enemy aircraft were shot down in air combat. Continuous air attacks of the previous day, the harassing attacks carried out during the night, and the numerous daytime strikes against traffic installations and troops, prevented the timely forward movement of sizable enemy forces and effectively supported the continuing advance of the German ground forces to the Montcornet-Rethel-Attigny area. [5]

Strong forces from the other German air fleet committed in France, the Second Air Fleet, were employed in like manner. Thus, the same situation report contained the following wing supplementary passages:

The /Second/ Air Fleet had the mission of supporting the

> advance and attack operations by forces of the Fourth Army /this was the main German assault army, which was to break through the French lines and by means of a drive to the Channel coast was to split the French forces/, and or providing cover for the left flank in a line from Abbeville through Amiens and Laon to Rethel; concurrently, forces of the air fleet were to prevent a French withdrawal across the Somme River.

A report of 19 May operations revealed the success of the Luftwaffe against French rail routes. Some 33 transport trains were halted between Revigny-sur-Ornain and Bar le Duc.

Attacks against rail targets made it difficult for the enemy to move reinforcements forward. The routes crossing a line extending from La Fère through Amiens to Abbeville in a northeastward direction, and thus into the rear of the German spearhead forces, were attacked repeatedly. Bombings caused particularly serious destruction to the rail installations at and south of Amiens.[6]

These examples suffice to show that air action supporting the ground forces by sealing off the battle areas (besides the close tactical air support given to army forces, which will be treated in a later section) also represented a decisively important contribution towards victory in the French campaign.

In the Balkan campaign, also, the air support given to the army ground forces in the form of action against the enemy rear communications made an important contribution towards bringing the campaign to a quick close. In the Yugoslavia operations, the final after action report by the Wehrmacht High Command[7] states that, "Through continuous combat action against the enemy communication and supply routes . . . the Luftwaffe did much to bring about the disintegration of the Serbian Army."

On operations in Greece, the final after action report on the campaign by the Wehrmacht High Command presented the Luftwaffe contribution:[8]

> Under overall command by the Reich Marshal /Goering/, the Luftwaffe through its speedy defeat of the enemy air forces and through action maintaining air supremacy throughout the

campaign made it impossible for the enemy to take air action planned to interrupt the planned progress of the operations.

In exemplary cooperation the Luftwaffe supported the Army through constant close and long-range reconnaissance operations; through combat action by dive-bomber forces facilitated the breaching of the enemy main lines of resistance; and through day and night attacks against the withdrawing enemy forces and their rear communications speeded up their disintegration . . . .

Particularly large successes were achieved by the bomber and dive-bomber forces in continuous attacks against enemy transport ships in the coastal waters around Greece. This prevented the planned withdrawal of the British forces and very seriously damaged British shipping.

In the Russian campaign, after neutralizing the Russian air forces stationed in Western Russia, the Luftwaffe, even in the first few days of the Russian campaign, changed over to operations in support of army operations on the ground. For this purpose the bomber forces and part of the dive-bomber forces were committed primarily in action to seal off battle areas. In the first few weeks of the Russian campaign so many moving columns of all types were detected all along the wide frontage that the forces available to the Luftwaffe were inadequate to take all of them under attack in addition to the execution of the other air missions, particularly the mission of rail interdiction.

In his study "The Luftwaffe in the Eastern Theater" (Die deutsche Luftwaffe an der Ostfront) General Plocher summarized the situation as follows:[9]

On the subject of troop movements it can be said that in the first few days and weeks of the campaign in particular, such movements were profitable targets for the bomber forces. Moving in two, and very often in three or four columns abreast on a single road (during the summer months the terrain on either side of the roads was used as a summer roadway, so that the roads then were often up to 100 yards wide) in close order, with motor and horse-drawn vehicles

between troops marching on foot /the Russian forces/ were pressing eastward and fell easy prey to the bomber forces.

During the first months of the Russian campaign in particular, when unbelievably large marching columns and troop concentrations were evident on the Russian side, unexpected technical difficulties were encountered by the German air forces in action against these targets. The principal problem was an insufficient supply of proper type bombs,* which seriously reduced the effectiveness of bombing attacks during this most crucial period of the campaign in the east. As a result, the enemy had far stronger forces available during the critical phases of the battles before Moscow than would have been the case if properly effective types of bombs had been available to the German side in adequate quantities.

Another air mission during the first year of the Russian campaign involved the support of ground operations during battles of envelopment. In 1941 strong Russian forces were compressed in large pockets on seven separate occasions./ During these battles 2,256,000 Russian prisoners were taken and 9,336 tanks and 16,179 artillery pieces were captured.

The mission of the German air forces in these battles of envelopment was to prevent the escape of the pocketed Russian forces through the German lines, and to frustrate attempts by Russian reserves to relieve the enveloped forces through attacks from the outside. In these operations the far sides of the pocket areas were closed initially only by small armored forces with their few motorized infantry elements, which had to prevent a Russian breakout until the German infantry divisions advancing on foot could arrive.

During the initial phases of a pocket, large gaps existed in the enveloping German lines, and if led by an energetic commander elements of the pocketed Russian forces could always find a point at which they could break out. The speediest and most effective way to seal off these gaps would have been to commit paratroopers, but the German command did not have enough of these forces available, since

---

* Editor's Note: See Part I, Chapter 2.

/ See Appendix 7.

the units had to be reestablished after the heavy losses they had suffered in the seizure of the island of Crete.

The mission of preventing the escape of the Russian masses from the pockets thus fell to the German air forces.* However, the Luftwaffe was only able to accomplish this mission very incompletely, since escape movements were often concealed against observation from the air by large wooded areas. Furthermore, it was impossible as a rule to take appropriate action at night, since no salient terrain features existed which could have served for orientation. As a result, large masses of Russian forces succeeded in escaping from the pockets.

Throughout the entire campaign air action against troop concentrations and troop movements played a highly important role, although the Russians soon learned to restrict their movements to nights and to break up their movements into small units. During Russian offensives, however, and particularly during the great offensives launched after 1943, large Russian troop concentrations and movements were in evidence even during daylight.

As had been the case in earlier campaigns, air operations against the Russian railroads commenced all along the line immediately after the start of the campaign. Owing to the numerous other missions of the Luftwaffe, however, and because of the enormous size of the areas involved, clearly defined areas of main effort in rail interdiction operations developed only on rare occasions. In the first year of the campaign one such area of main effort was that of Smolensk-Bryansk-Gomel-Mogilev in June 1941. At the beginning of July, during the Battle of Kiev, forces of two air fleets were committed to develop a concentration of such action in the Kiev-Kazatin-Shepetovka-Korosten area.[10] Concerning the June 1941 rail interdiction operations in the Bryansk area of main effort, the Military History Division of the Luftwaffe reported that operations against the rail network were extended to include the Gomel-Smolensk-Mogilev area, the farthest line of the area under interdiction being roughly 420 miles east of the foremost German tank forces spearheading the German advance. Concurrently with direct support

* See Appendix 8.

action of the continued drive towards Smolensk, the Second Air Fleet directed attacks primarily against the rail system, which was interdicted to a depth of 180 miles.[11]

Interdiction of the railroad system in the areas referred to above was of particular importance for the progress of operations in the eastern theater as a whole, since main emphasis in operations on the ground was in these areas. Indeed, on 13 July 1941 (three weeks after commencement of the campaign), the Wehrmacht High Command considered it as an established fact that destruction of the Russian railroads had deprived the Russians of all possibilities for large-scale counteroperations.[12]

The scope of air operations in the first six months of the Russian campaign is evident from figures taken from an after-action report by the II Air Corps,[13] which was withdrawn from the eastern theater in November 1941 for transfer to the center. The II Air Corps was one of the five air corps initially committed in the eastern theater.* According to the report, units of the corps in the period from 21 June 1941 (the date on which the campaign opened) to 13 November 1941 flew 3,579 rail interdiction missions. In these missions the corps' units achieved the following results:

Railroads destroyed at	1,736 points
Number of trains destroyed	159
" " " damaged	1,584
" " locomotives destroyed	304
" " " damaged	103

The majority of the railway trains involved were ammunition trains, which exploded, and trains set on fire while en route. In addition, units of the corps continuously attacked loading and unloading operations.

Although 1941 must be considered as the peak year of interdiction operations against the Russian railroad system, air operations against Russian rear communications continued with a varying

---

* Editor's Note: II Air Corps was assigned to Second Air Fleet which was committed in the zone of Army Group Center.

degree of intensity throughout the war. However, the countermeasures introduced by the enemy made it impossible to achieve results later in the war equal to those achieved in 1941. Besides exploiting the dark of night and periods of bad weather for their rail movements,[14] the Russians held large reserves of personnel and large supplies of repair materiel available along the routes, and this enabled them to repair within a surprisingly short time any damage done by attacking aircraft. Thus, the above-cited report by Zantke observed that the effects of bombing of the railroad in the Karkhov area were eliminated within 72 hours, traffic being resumed "on miles of tracks laid down on a landscape of bomb craters on the virgin soil to detour the destroyed route." Another complicating factor was the difficulty of destroying rail tracks in winter. Bombs usually bounced off the hard, frozen railroad and exploded harmlessly nearby.

The results achieved in the bombing of rail tracks continued to decrease, for which reason the decision was taken in 1942 to shift emphasis in rail interdiction operations to attacks against railway trains travelling at night in the near front areas. In order to be able to detect these trains, various bomber units organized special rail interdiction squadrons manned by specially trained personnel, as was the case with the 9th Squadron of the 3d Bomber Wing, and the 14th Squadron in each of the 27th and 55th Bomber Wings.* Although these squadrons achieved satisfactory results they were deactivated at the end of 1944 owing to fuel shortages.

As the war drew on the Russians resumed daytime railway traffic on a steadily increasing scale because of their improving position in airpower. Consequently, the German ground-attack air units which had been activated in the meanwhile and were equipped with FW-190 fighter type aircraft each received one special rail interdiction squadron. Since these planes could only carry a small number of bombs they were to concentrate primarily on the destruction of Russian locomotives, for which purpose they were also to

---

* Editor's Note: In 1941, both the 27th and 55th Bomber Wings were in the Fourth Air Fleet (Army Group South), the former in the IV Air Corps, the latter in the V Air Corps. The 3d Bomber Wing was in the Second Air Fleet (Army Group Center), II Air Corps.

take the locomotives under direct fire with their guns.

In 1944 the Rail Transport Division of the Army High Command considered that the Russians were beginning to suffer under an acute shortage of locomotives. Thereupon emphasis in all rail interdiction action was shifted to attacks against locomotives. There can be no doubt that the Russians have Allied supplies to thank for the fact that these attacks also failed to produce decisive results. Thus, one American writer established that,[15] "In the three and one-half year period /October 1941-May 1945/ under consideration we delivered to the Russians 1,900 steam locomotives, 66 diesel oil locomotives, 9,920 flat cars, 1,000 dump cars, 120 tank cars, and 35 /rail cars for the transportation of/ heavy machinery. . . ."

Rail interdiction operations were resumed in the summer of 1944, when the IV Air Corps,* whose units were manned by personnel trained specifically for long range air combat missions, went into action. A number of bomber units had been withdrawn from the eastern theater at the end of 1943 for this purpose and given specialized training for missions of strategic air warfare. After completing their course of training these units were assigned to the IV Air Corps for operations against the Russian rail transport system.

In contrast with the methods employed formerly in rail interdiction operations, the decision was now taken to attack large rail depots. In the past attacks had been directed against such targets only on rare occasions, although events had revealed how successful such action could be. Thus, two unit after-action reports were available from former years on successful action against sizable rail depots. On 14 July 1941, units of the V Air Corps destroyed the depot at the important rail junction of Bakhmach (on the Kiev-Kursk route), together with approximately 1,000 rail cars. In addition, major damage was done to the Vyazma rail depot, which, according to prisoners' statements, was inoperable for 15 days following the attack.[16]

In view of the success achieved on these occasions it is

---

* Editor's Note: IV Air Corps was in the central portion of the front, under Sixth Air Fleet.

astonishing that the decision was only taken in 1944 to change over from the system of pin-prick attacks against Russian railroads to concentrated attacks by massed air forces against the larger targets. In part this may have been due to the circumstance that worthwhile targets of this type were only to be found farther in the enemy rear, and to the fact that the Luftwaffe had no long-range escort fighters available and that the bomber units were not adequately trained for night operations.

In the 27 March-22 July 1944 period the IV Air Corps on twenty occasions dispatched large forces to attack important Russian rail depots, some of which came under attack as many as six times. The 55th Bomber Wing, one of the three wings operating under the IV Air Corps, reported that between 27 March and 5 May 1944 units of the wing flew 3,164 railroad interdiction missions.[17]

The Battle of Kiev in 1941 involved a typical air action to seal off a battle area. In order to gain possession of the Ukraine, the Wehrmacht High Command on 21 August 1941 ordered a "concentrated operation" by the left flank forces (Seventeenth Army and First Panzer Group) of Army Group South and right flank forces (Second Army and Second Panzer Group) to be staged from the lines Kremenchug-Cherkassi and Gomel-Pochep, respectively. The operation was executed in four weeks of continuous combat action and culminated in the Kiev battle of envelopment.

The air mission in these operations was to support the advance of Army forces on the ground and, by sealing off the battle area in the far enemy rear, to prevent countermeasures which the Russian side was definitely expected to take.[18] Developments in the operations reveal with striking clarity the varied missions which developed time and again for the German air forces during the large-scale offensive operations of the German Army, both in the west and in the east, in World War II. Emphasis during such operations shifted continuously between missions of close air support within the battle areas and air action in the far enemy rear to seal off the battle areas. The great flexibility and mobility of airpower was exploited to the utmost, and the capabilities of the troops were strained to the breaking point.

The air support mission in the operations under discussion

was assigned to the V Air Corps, under General der Flieger (Lieutenant General) Ritter von Greim in the southern area, and to the II Air Corps, under General der Flieger Loerzer in the northern area. *

The two air corps were assigned the mission of supporting the advance of the ground forces, particularly of the armored units spearheading the attack; of preventing the forward movement of enemy reinforcements from the east; and of breaking up enemy retrograde and evacuation movements of any type on rail and road routes leading eastward.

The initial situation was favorable for the air units committed, since the II Air Corps had just advanced its base airfields far forward. Furthermore, the important Kursk-Konotop-Kiev rail route available to the Russian side was largely parallel with a salient in the northern part of the German front on the ground. The fact that it was so close enabled the German bomber forces to make several repeat attacks daily. Operating from the area southwest of Kremenchug, the units of the V Air Corps had the Russian Karkhov-Poltava-Kiev rail route within a very favorable striking range.

In executing their air mission/ the two air corps employed the method of concentrated action to support the advance on the ground when it was necessary to break through fortified enemy positions, to force a crossing over rivers, or when other causes halted the advance on the ground, particularly the advance of the armored units. Culminating points in the operations developed for the II Air Corps on 14 and 23 September, for the V Air Corps on 19, 21, and 23 September 1941.

Whenever the tactical situation on the ground permitted, however, air attacks were directed primarily at the far enemy rear, to seal off the battle area. This led to the development of a systematic plan of rail interdiction action in addition to combat action against

---

* Editor's Note: V Air Corps was under the Fourth Air Fleet (Army Group South), and II Air Corps was under Second Air Fleet, on the right wing of Army Group Center.

/ See Appendix 9.

columns moving along roads, the combined effect of which was systematically to seal off the battle area of Kiev.*

In the 1-11 September 1941 period the V Air Corps committed relatively weak forces to interdict the rail route leading from Karkhov through Poltava into the pocket area, but at the same time dispatched units to attack all other rail routes leading westward and southward from the west through Karkhov and farther east. Approximately on 10 September, the day on which the First Panzer Group commenced its drive on the ground, the V Air Corps shifted emphasis to attacks directed against targets within the pocket area; these attacks were apparently designed to prevent the movement of Russian reserves to the vicinity of the battle area. After the pocket was closed, V Air Corps units commenced lively combat action against the rail routes southeast of Karkhov to a depth of 180 miles in the enemy rear, in order to prevent the forward movement of Russian reinforcements and materiel from the rear areas.

For the II Air Corps, the necessity to protect the flank of the Second Panzer Group involved initially the most important task of interdicting the Bryansk-L'gov rail route and the rail routes within the Bryansk area. After this the air corps continuously dispatched strong forces against the Kiev-Kursk rail route, and from 11 September on, after the forward units of the Second Panzer Group had advanced to the close vicinity of this route, against the branch lines towards the south.

Besides air attacks against Russian troop concentrations within the pocket which was gradually shaping up, the approaching culmination point in operations on the ground again brought into prominence the necessity for action to interdict the rail routes to L'gov, since it was to be expected that the flank of the German attack would be threatened from there by new Russian forces which could be moved into that area. Weather conditions were not too favorable for air operations, and heavy rains repeatedly made the execution of air missions exceedingly difficult for days on end.

Some of the air strikes were executed by sizable forces which

---

* See Appendix 10.

did their bombing from altitudes of between 6,600 and 13,200 feet. As a rule, however, air missions were carried out by small units of between two and four aircraft at low to almost ground levels in the form of armed reconnaissance operations. This was due in part to current weather conditions and in part to the aggressive spirit of the bomber crews resulting from their complete confidence in the superiority of their equipment. A few night attacks were directed against heavily travelled rail depots, for example against Karkhov on the night of 15-16 September, to increase the effectiveness of the overall air operations.

The primary target was railway rolling stock. During the most crucial periods of the battle, for example on 8 September, units executed as many as fifty strikes against locomotives and against complete railway trains. Special type SC-100 bombs were used repeatedly. Frequent use was made of 4.4-pound (2 kilogram) bombs in containers in an effort to cause fires.

It is no longer possible to determine to what extent the Russian rail system was permanently damaged. The fact that only very few man-made structures existed in the areas under attack resulted in few possibilities to do any lasting damage. However, reports from the period under discussion mention large numbers of trains halted and numerous trains derailed. Although it must be said that the effects of each individual air attack were not always great, the cumulative effects of the operations can be considered as adequately satisfactory. The Russian side was no longer in a position to maintain properly scheduled traffic, to move in essential supplies to the troops inside the gradually developing pocket, or to move the Russian forces out of the trap which was closing. Large numbers of trains were frequently observed halted on the main lines. At some points, however, and even within the area under German attack, the Russians did succeed in moving in reserves from the outside. On 18 September, for example, the Second Panzer Group came under attack by a Russian tank division and a cavalry division newly arrived in the area.

On the whole, however, the Russian Command was unable to commit forces which would have been strong enough decisively to influence the course of the battle. In retrospect the question must be asked whether the same results could not have been secured at smaller costs by means of a few heavy attacks by concentrated forces against

important rail junctions situated farther in the enemy rear instead of the thousands of individual attacks directed against the various rail tracks.

In the campaigns in Poland and France the destruction of bridges contributed largely to the success achieved in operations on the ground. In the opening stages of the Russian campaign this was also true. A case in point is that of the destruction of an important bridge in the eastern theater, which resulted in the capture of thousands of vehicles by the German forces.

However, events were to prove as early as 1941 that the growing strength of the defenses at bridges was to make their destruction increasingly difficult with the means then available, and that even large bridges could be repaired within an astonishingly short time. In 1941, for example, the Army requested air action to destroy bridges across the Dnepr River in the central sector of the eastern front. Destruction of these bridges was to prevent the withdrawal of Russian forces across the river, it being assumed that German forces would have been unable to capture the bridges in an undamaged state. Dive-bomber forces succeeded in damaging the big railway bridge at Bobruysk to such an extent that railway experts considered that it would be inoperable for a long time. Surprisingly enough, however, the bridge was in operation within a few days. After the area came under German control it was discovered that the Russian Command had moved in specialized personnel by special trains from Moscow immediately after the bridge had been damaged. Working day and night under the supervision of a high member of the Communist Party with ministerial rank, these personnel had quickly restored the bridge to temporary operability.

Thus, the destruction of bridges did not represent a decisive factor for the German side as the war continued. The unsuccessful efforts of the German Command in 1945 to destroy the Vistula River bridges by air attacks, in which even the most modern means were employed, was nothing short of tragic.

Since the Western Allies in 1944 did succeed through the destruction of bridges in France--and this applies particularly to the bridges across the Seine River--in preventing the timely forward movement of German reinforcements against the invading Allied

forces, it must be assumed that the failure of the Luftwaffe to accomplish similar missions must have been due to inadequate technological developments on the German side, quite apart from the general inferiority of German airpower at the time.

The possibility of using paratrooper sabotage teams for bridge demolition is mentioned in paragraph 172 of Air Field Manual No. 16. And during the war the Luftwaffe occasionally applied this method. When forces of the Western Allies in November 1942 occupied French North Africa, for example, the Commander in Chief, Southern Theater of Operations, ordered that paratroopers were to be dropped with the mission of destroying the bridges on the rail and road routes along the Mediterranean coast, on which routes the Western Allies had based their whole supply system.* In the extremely mountainous terrain of the region numerous large man-made structures were to be found along these traffic routes.

To direct the airborne operations involved, the Commander in Chief, Southern Theater of Operations, assigned to the Panzer Army of Tunisia an officer with exceptional experience in this field. A number of missions of this type were carried out. In view of the fact that the enemy succeeded in repairing the damaged bridges within a very short time, however, the Panzer Army discontinued the operations without informing theater headquarters.

Post-war publications, however, present an entirely different picture of the results achieved. Thus, it can be gathered from Eisenhower's Crusade in Europe[19] that the entire 34th US Infantry Division had to be withdrawn from line in mid-February 1943 and employed exclusively to protect the rail and road routes. Furthermore, the Allied Supreme Command in March established that the withdrawal of Free French Forces from the line for large-scale rail and road defense missions was one of the important factors contributing to the serious defeat suffered by the American forces at Kasserine Pass. According to the officer serving as aide to General Eisenhower at the time, the operations of these German demolition teams, which comprised approximately 60 German and 20 Arab personnel, resulted in the withdrawal of more than 100,000 Allied combat personnel from

* See Appendix 11.

the front for guard duties. The Luftwaffe thus achieved a remarkable success in these operations of indirect support for the Army.

By way of conclusion and recapitulation, it might be said that events of the war proved that the principles established in German regulations on the conduct of operations for the commitment of air-power to support the Army by sealing off battle areas were generally sound. In many cases adherence to these principles enabled the air forces to influence the outcome of operations on the ground decisively in favor of the German side.

The Luftwaffe Command had realized even prior to the war that if interdiction operations were to be successful they must produce interruptions of long duration and therefore would require the commitment of considerable forces. On the basis of war games conducted prior to the war it was assumed that one bomber wing of three groups would be required permanently to keep a rail route inoperable. Generally speaking, these computations proved correct so far as the eastern theater was concerned.

If a number of wings were committed to interdict rail routes, it was found advisable to assign each wing one specific route and not to change the assigned route for the duration of the mission. This insured that the aircraft crews would be intimately acquainted with the direction of the route, the man-made structures to be taken under attack, and similar details.

Although the German Command had taken it for granted that the enemy would do everything possible to keep their railway system in operation, it was not thought that the Russians, within a few months after the opening of the campaign, would be able to repair damages in the short time and on the scope which they actually did.

In the matter of rail interdiction operations, the German Command had been mistaken on one point. German air doctrine in general rejected the idea of attacks against large enemy rail depots because, as Field Manual No. 16 puts it, "the large number of tracks at such depots offer adequate detouring possibilities even when a number of tracks are damaged or destroyed . . . ," and because, "Large rail depots as a rule are heavily defended and have adequate personnel and materials available for the quick repair of damages . . . ."

The German Command in prewar days had considered rail interdiction too restrictedly as a means to halt large troop movements. Too little consideration had been given to the fact that the large rail depots of a railroad system are the collecting points of rolling stock, plus the freight on the trucks present, and that they therefore should have been included among the targets of operational air warfare. Concurrently with the general effects of the destruction of rolling stock, attacks against large rail depots would have served to halt the flow of "means of power" to the combat fronts, since no railroad system can perform the functions for which it is designed if its rolling stock and its supply and repair installations are destroyed. Attacks against large targets of this type would also have been more in accordance with the nature of air forces than attacks to destroy specific points of a railroad or locomotives, targets which in exceptional circumstances might also at times be appropriate.

As previously mentioned, the German air forces did not always at the proper time have the appropriate weapons available for the performance of its mission of sealing off a battle area. Thus, at a crucial juncture, it lacked bombs suitable for action against moving troop columns and troop concentrations. Later in the war, for action against man-made structures, such as bridges, the German side lacked appropriately precise bomb aiming devices. Furthermore, the German aircraft crews were inadequately trained for the execution of missions of this type, and during the war there was no time or opportunity to give them such training.

Direct Air Support for the Army

It had become evident even in World War I that situations can develop in ground combat in which the only possible way to support the army forces is by means of direct air combat action against the enemy forces on the field of battle. Even in those early days this realization resulted in the establishment of special air units for such purposes.

On 10 July 1917 infantry forces attacking in the zone of the German Fourth Army in the coastal areas of Flanders were accompanied for the first time by a complete squadron of aircraft, which took the enemy under fire with their mounted weapons and thus prepared the

way for the attacking German infantry. This introduced the new form of close air support for the army on the field of battle. The effects of this action on the enemy, both in the form of actual losses inflicted and in the form of its impact on the enemy morale, were so outstanding that the Commanding General of the Air Forces, at the time the highest authority in command of all army air forces, immediately proceeded to apply the experience gained and to re-form the existing air units accordingly. From then on ground-attack air squadrons (Schlachtstaffeln) supported the army operations through direct action at the front, in the form of strikes against the enemy infantry and artillery concentrations, reserves, and transportation and supply installations.

The German spring offensive in March-April 1918, known as the Great Battle in France (Die Grosse Schlacht in Frankreich) saw a peak in the size and frequency and successful achievements of the new form of air support. A method had been found to employ airpower in operations to open up the way for the infantry through the enemy trench systems of World War I, and in operations supporting the ground forces directly on the field of battle during periods of crisis. For the command the ground-attack squadrons represented a highly effective reserve force which could be brought to bear without delay at any point of the front currently under threat.[20]

It was to be expected that in any future war situations would also develop on the ground which could only be mastered by aircraft with their great speed and flexibility in combat. The need for such air action could develop: 1) During army operations on the ground to enable friendly ground forces to reach their objectives or, conversely, to prevent the achievement of decisive successes by enemy forces; 2) at the beginning of a friendly offensive to support the ground forces in operations to breach the enemy fortification system (to break the outer crust of resistance); 3) during the initial stages of an airborne or amphibious operation to take the place of the heavy weapons which would not be immediately available after the initial landing; 4) in cases where the friendly ground forces were pronouncedly inferior in heavy or special type weapons, such as antitank weapons; and 5) the appearance of enemy weapons, such as tanks or rocket projectors, in terrain closed against friendly artillery observation, or which because of their small size and/or high mobility could only be destroyed by means of precisely aimed direct fire.

Although German air doctrine showed marked preference for the employment of airpower in attacks against massed targets in the far enemy rear because of the better prospects of profitable results to be achieved in such action, it did not reject the idea of the employment of airpower on the field of battle under certain conditions. Thus, the later (1940) edition of Air Field Manual No. 16 contained the following passages on the subject:*

> Strong forces of the Luftwaffe can be committed to participate in critically important battles on the ground.
>
> The methods of cooperation with army forces will vary in accordance with the current situation, the time factor, the nature of the mission, the objectives aimed at, terrain conditions, and the strength and nature of the forces available. No fixed pattern exists. The ruling requirement is that the mission must produce results of decisive importance for the Army.
>
> For the bomber forces it is thus important to strike those targets the neutralization of which will best serve the interests of the army forces or give them the best support in executing their missions, or which will do most to thwart the plans of the enemy.
>
> The more closely the opposing armies are locked in battle, and the closer the decisive battle approaches, the greater will be the effectiveness of action by bomber forces in near front areas.

However, the above is qualified by the statement that an air attack against enemy forces with a good tactical position in the line "as a rule is unlikely to produce results commensurate with the effort expended, although such action might be required in special circumstances."

It should be noted that the implied restrictions here to not apply to air attacks at the beginning of an offensive on the ground. In

---

* Editor's Note: Paragraphs 125, 126, 129, 130.

such cases the enemy ground forces as a rule are badly shaken by the preceding or at least simultaneous concentrations of artillery fire delivered in preparation for the attack. Furthermore, the enemy forces in such cases can be considered as restricted in their movements by the effects of the attack staged on the ground, and are therefore not in a good tactical position.

In general terms, however, paragraph 132 of the manual places definite limitations on direct participation by air forces in action on the field of battle. "Air action within the range of friendly artillery fire is only justifiable," observes the manual, "in cases where the artillery is unable fully to accomplish its mission."

An examination of the regulations contained in Air Manual No. 16 is likely to create the impression that, although the possible necessity for air action on the field of battle is admitted, such action is nevertheless considered as the exception rather than the rule. However, it was fully realized in the Operations Branch of the Luftwaffe High Command prior to the war that, in the event of war, it would be necessary to hold available a number of single-engine ground-attack air units for the execution of unavoidable special missions on the field of battle. In order not to jeopardize the build-up of the operational air forces, to which end all efforts had to be directed, the development of ground attack air forces was restricted to the establishment of an experimental ground-attack group as part of the Air Training Wing, which at least made it possible to gather the necessary experience in this field.[21]

After events in the Spanish Civil War had again demonstrated the value of ground-attack air forces to support the army forces on the ground, the decision was taken at the time when war against Czechoslovakia seemed imminent to expedite the activation of a small number of ground-attack air groups. The units thus activated were retained and reorganized prior to the beginning of the campaign in Poland. At the time of their initial activation, however, they were only organized on a limited basis and considered as an auxiliary arm. The idea was to concentrate them at only one single point of the entire front, namely in the area of main effort in army operations, where they were to support the advance of the spearhead units on the ground. The soundness of these views was fully vindicated in the campaigns in Poland and France. Under command of General Freiherr von

Richthofen the existing ground-attack units opened the way for the armored units spearheading the German advance on the ground, first in Poland and later in the drive to the Channel Coast in the west. Action by these forces thus became an integral part of the pattern for the conduct of blitz warfare. This arrangement left the aggressive or so-called operational air forces free for commitment in missions more in keeping with their nature, to attack large targets, such as enemy rear communications, in the far enemy rear.

This clear-cut division of responsibilities was changed at the beginning of the Russian campaign. Because of the wide frontage in the eastern theater, and because of the usually simultaneous existence of a number of points of main effort in army attack operations on the ground and the frequent shifts of main emphasis, the forces under General von Richthofen, which had in the meanwhile expanded to an air corps,* were no longer strong enough to assume responsibility alone for the mission of providing close air support to the army forces on the field of battle.

As soon as temporary German air superiority had been established in the theater, the other air corps were also assigned tactical air support missions. They developed steadily into tactical air corps. Consequently, the air fleet headquarters controlling these corps also assumed the role of tactical headquarters, instead of serving their intended purpose as operational or strategic headquarters, and thus were exposed to continuous pressure by army commands.

The relative weakness of the German Army, its lack of certain weapons, such as antitank weapons, coupled with the organizational features of the German military establishment, produced conditions in which the Luftwaffe was called upon with increasing frequency to provide direct support for the Army and thus it departed more and more from the principles previously observed in the employment of air-power.

Another factor which also contributed towards this development must not be lost sight of. This was the fact that the war had

---

* General von Richthofen commanded VIII Air Corps, under Second Air Fleet.

meanwhile developed into a conflict on three fronts, requiring the commitment of air forces in the continuing operations against Britain, and in the Mediterranean theater, circumstances which seriously weakened the overall number of air units available in the eastern theater.

Concerning the changed mission of the Luftwaffe, General Plocher observed that, [22]

> The campaign in the west, in 1940, had brought about another shift of emphasis in the mission. Direct air support for the Army on the field of battle had become just as important as indirect support . . ., which in the past had been considered as the primary mission of the Luftwaffe.

Another study voiced the opinion that it was soon discovered that the Army, confronted by stronger forces, only made good progress when it had effective airpower in active support. Soon after the opening of the Russian campaign, it became habitual for the armored forces to depend in forward movement on heavy support by the Luftwaffe. [23] And the commander of an infantry regiment placed a high value indeed on direct support. "Tanks in the lead," he wrote, "artillery in the rear, and aircraft overhead--only then will the infantry advance to the attack." [24] In consequence of all these circumstances Hitler, as the Commander in Chief of the Wehrmacht, in the autumn of 1941 ruled "that large-scale offensive operations by the Army will only be allowed to commence after the possibility has been insured for extensive support by the Luftwaffe."

Higher levels of command regarded with mixed feelings this change in the employment of airpower from indirect army support in a steadily increasing measure to missions of direct support. An officer who served as Chief of the Operations Section in the Luftwaffe Operations Staff observed that the general tendency of thinking in the Luftwaffe leaned decidedly toward giving the Army indirect rather than direct support. In actual fact, however, air operations were usually direct support, and this was the result of direct cooperation between Luftwaffe and Army commands within the zones of operations, rather than of "the basic intentions of the highest levels of the Luftwaffe command." [25]

If this employment of airpower on the field of battle had been restricted to periods during which the army forces were engaged in battles of decisive importance, it could at least in part have been considered justifiable. However, even during quiet spells the army commands insisted on the constant commitment of airpower against enemy targets within the battle areas in order to conceal their own weaknesses in point of numbers and of weapons. Operations of the Luftwaffe thus became increasingly dependent on the Army.

The extent to which the Luftwaffe High Command accepted this circumstance as inevitable is evident from the following passage by Field Marshal Kesselring:[26]

> I instructed my air force and flak generals to consider the wishes of the Army as my orders, without prejudice to their subordination to me, unless serious air interests made compliance seem impracticable or detrimental. All my commanding officers and I prided ourselves on anticipating the wishes of the Army and on carrying out any reasonable requests as quickly and as completely as we could.

Targets for air attack which were of particular importance in their bearing on the conduct of army operations were moving and fleeting targets, such as advancing enemy infantry units, moving guns of all types, tanks, ammunition transport columns, and enemy reserves. In addition, it was important in special circumstances to take stationary and fortified targets under attack, e. g., fortification works, infantry and artillery positions, and bunkers. Other categories of targets for air attack included bridges, command posts, and signal communication centers. A characteristic feature of all of these types of targets is their small size, which makes it particularly difficult to attack them by air.

In the first years of the war it was a general rule to commit only single-engine bomber units, such as dive-bomber and ground-attack units, to missions within the battle area. Owing to the small size of the targets to be taken under attack, it was necessary to carry out such missions at low altitudes in order to be able to recognize the assigned targets. The dense concentration of weapons in the areas involved represented a very strong air defense, since these weapons could also be brought to bear against aircraft, and for this reason

THIS PAGE DECLASSIFIED IAW EO12958

multi-engine aircraft presented too large a target for defensive fire from the ground, and the losses incurred were too heavy. Even in the most favorable circumstances, multi-engine aircraft were put out of action for a considerable time for repairs, owing to the numerous hits they received. Multi-engine (bomber) units were therefore employed within the battle area only in exceptional circumstances, when it was important at the beginning of an offensive on the ground to support the infantry in the initial attacks to break through the enemy system of positions. Another exceptional case in which it was necessary to commit bomber forces in action over the battle area was when a cloud ceiling below 2,600 feet prevented the commitment of dive-bomber units during a particularly critical situation in ground combat.

Apart from the use of multi-engine units during large-scale Russian offensives, it was only later in the war that the increasing frequency of critical situations on the ground in the eastern theater resulted in the frequent commitment of such units over the battle area, although the number of ground-attack units had increased considerably by then.*

Air-Army cooperation on the field of battle created the necessity for special liaison and control measures to cope with quickly changing situations and to avoid bombing friendly troops. The best contact was maintained when the tactical echelons of the two cooperating headquarters (Army and Luftwaffe) were located in the same place or in an advanced command post. General von Richthofen, who commanded the only really large close support force available to the Luftwaffe, often applied this method during particularly critical situations.

At the beginning of the Russian campaign the other German air corps were required to accomplish large-scale close support missions in addition to their primary mission of conducting the operations of bomber forces. It was found during the rapid German advance in 1941 that these headquarters were not able to handle both responsibilities simultaneously without one of the two missions suffering considerably. On the ground the armored units, which had to rely on air support by the tactical air support units of the various

---

* See section on ground-attack forces in Part I of the present study.

air corps, had broken through the Russian main lines of defense and were carrying their attack forward into enemy territory in wedge-shaped movements. Operating from provisionally constructed field type airfields, the tactical air support units had to follow closely in their rear for reasons of contact, operating ranges, and safe operation. The non-motorized army divisions following up the armored forces on a wide front were often as much as 48 miles farther in the rear on an average. Enemy forces time and again penetrated from the flanks into these gaps, so that it was not possible to establish secure signal communications. Being responsible for the direction of operations by their bomber units, which had to rely on the availability of large airfields and rail carried supplies, the air corps headquarters found themselves compelled to establish special tactical air support sections to direct the operations of their tactical air support units. A Tactical Bulletin from Luftwaffe headquarters of 2 May 1941 required the tactical air support commander and his staff to be "located in the immediate vicinity of the headquarters or command post of the army command to be supported," for only close physical contact would enable the air support commander to acquire the necessary current data for the effective operation of his units. This method produced good results during the large-scale German offensives of 1941-42 in the eastern theater.

By 1943 the tactical air support commands were deactivated, since no offensive operations on an appropriate scale were staged from then on. Since fierce fighting had developed all along the line, and since each air corps had to support between two and three armies, the points of main effort shifted so frequently on such wide frontages, that it was possible only in exceptional cases to have the tactical air support command located together with the tactical echelon of the army corps currently being supported. Instead, these responsibilities had to be assumed by liaison detachments or teams. In order to arrange the appropriate agreements between the air fleet headquarters and the army headquarters concerning the allocation of air units to support army operations, the air fleet headquarters had to be fully informed on the current situation and the plans and desires of the army commands concerned. The wide distances separating air fleet from army headquarters (and in spite of the frequent visits made by the air fleet commanders and chiefs of staff to the various army headquarters) made it necessary that close contact be established and maintained by these liaison teams.

Owing to the scarcity of adequate housing space, particularly in the eastern theater, it was not always possible for the air fleet and army group headquarters to be located close enough together, thus necessitating liaison teams even at this level. A basic directive from the Wehrmacht High Command established that it was a responsibility of the Luftwaffe to maintain contact with the Army, so that the Luftwaffe was required to furnish the necessary facilities for such purposes. To secure this necessary contact, the air fleet headquarters assigned liaison teams, whenever possible under a General Staff Corps officer, to the appropriate tactical air support commands attached to the various army group and army headquarters. After deactivation of the tactical air support commands attached to army groups and armies in 1942, the liaison teams were expanded and assumed some of the former responsibilities of the tactical air support commands.

During the war air corps also frequently found it impossible, for various reasons, to have their tactical staff echelons located together with the tactical staff echelons of the army commands they were currently to support. As a rule each air corps had to furnish support to between two and three field armies controlling up to as many as twenty army corps operating on frontages as wide as 240 miles with frequently changing areas of main effort. Since it was essential for each air corps to have direct communication lines (if at all possible, wire communications) with all airfields on which air units were based, it was rarely possible to establish direct communication lines with an army corps committed in an area of main effort. In fact, this was only possible in the exceptional case of attack operations planned well beforehand in otherwise quiet segments of the front. The introduction of wireless telephony towards the end of the war, however, also gave the air corps tactical staff echelons greater opportunities for flexibility in their operations. The difficulties which existed prior to the introduction of wireless telephony also necessitated the use of liaison teams at this level of command, although these teams differed from the liaison teams at higher levels of command in respect to their composition and their technical equipment.

As early as World War I it had been customary for the air forces to attach air liaison officers to the army divisions operating in areas of main effort. The missions of these liaison officers had been to keep the officer directing the operations of the air units

informed currently on developments in the ground situation, particularly on the location of the forward lines--which were difficult to detect from the air, on the intentions and plans of the army command concerned, on important targets within the battle area, and on the current air situation. In order to make them independent of insecure wire communications, such liaison officers at times were given wireless stations, plus the necessary operating personnel, so that the function of liaison in such cases was taken care of by liaison teams instead of by a single liaison officer.

During the Spanish Civil War when the German Command in Spain decided to commit its He-51 aircraft in ground support action because they were no longer suitable for air-to-air combat, it also made use of liaison teams, which were assigned to accompany the army commands or the units spearheading an attack on the ground. General von Richthofen, at that time a colonel in command of the German Condor Legion operating in Spain, used personnel from the 88th Air Signal Battalion to organize a small number of radio teams with specially trained signal communication officers for the purpose.

During preparations for the campaign against Poland, von Richthofen was assigned in command of Special Purposes Air Command (Fliegerfuehrer zur besonderen Verwendung) and was assigned the mission of directing the operations of a number of air units intended for tactical action supporting the army in areas of main effort. He immediately took measures to organize four teams of the type described above, which were designated Air Signal Detachments (Luftnachrichtenverbindungstrupps). The mission of these detachments was to insure the close contact with the Army essential for the execution of air combat missions on the field of battle. Of these four detachments, two for the first time on record were equipped with one armored reconnaissance car each, complete with radio equipment, in order to be able to accompany the commanders of armored divisions when the commanders proceeded to a battle area to lead their troops. The radio messages were transmitted in code according to a locally established code chart.

Greater use was made of these detachments in the French campaign, in which they proved indispensable. Consequently the number of such units was increased prior to the Russian campaign, during which such detachments were assigned also to the other air

corps, which, as previously mentioned, were called upon on an increasing scale to accomplish tactical air support missions. The newly established Air Signal Liaison Detachments, as they were now designated, consisted of an air signal officer with special training to qualify him for his tactical missions, a motor vehicle driver, and four radio operators. Each detachment had a two-set radio station, which was to be maintained in operation day and night without interruption. At the beginning of the Russian campaign the detachments assigned to armored units had armor-plated vehicles, and in some cases tanks, with the appropriate radio equipment, so as to be able to accompany the army staff section to which they were assigned when the unit commander proceeded to the battlefield in his armored command car.

Administratively, and for supplies, the detachments were assigned to a Special Purposes Air Signal Company stationed at the next appropriate air unit headquarters, usually at corps level. The air corps, air division, or other air command responsible for the direction of air combat within an area, controlled the operations of the air signal-liaison detachments assigned to army commands within that area. At the opening of the Russian campaign each army corps, and in exceptional cases army divisions, operating in areas of main effort or in areas which it was presumed would become critical, had one air signal-liaison detachment. As the tactical situation became increasingly critical, with rapidly changing areas of main effort, the majority of the army corps committed in the eastern theater received one such detachment each.

The mission of an air signal-liaison detachment was to report currently to its air corps all special events which occurred in the front area, whether in the air or on the ground. In addition it was required to report at set intervals to its air corps concerning the location of the forward defense lines within the zone of the army corps it was servicing. This meant that the ground situation map at air corps headquarters had to be posted currently at all times, so that all necessary data would be available whenever the point of main effort shifted, even if this shift was to an entirely new area. Other information reported included items on the air and ground situation.

However, army corps were not authorized to forward requests for air strikes through the air-signal-liaison detachments to the air

corps unless main emphasis in air operations happened to be within the army corps' zone. In other cases each army corps forwarded its requests to its superior army headquarters, where the decision was taken, after a proper examination of the circumstances, whether the request was to be fulfilled.

During the Spanish Civil War and the first years of World War II air signal-liaison detachments were occasionally also assigned the mission of directing approaching air units to specific targets difficult to detect from the air, using radio instruments in forward observer posts for the purpose. However, the most suitable points for such observation posts were usually located at points distant from those at which the army corps (to which the detachment was assigned) had its headquarters or command post. Consequently, contact between the army command post and the supporting air command was subject to frequent disruption during critical situations, and it was during such situations that air support was required. Another weak point was that the officers from the Air Signal Corps who commanded the air signal-liaison detachments did not have adequate tactical knowledge to direct an air strike properly.

For the above reasons the Luftwaffe High Command decided to establish special forward air control detachments to direct air strikes from the ground in critical areas of operations. From then on air corps headquarters, by radio, instructed dive-bomber forward air control detachments (and later ground-attack forward air control detachments) to proceed to the point from which they were to direct a planned air strike. There the detachment would take up its position at an observation point from which it could observe the field of battle. From this point the detachment established radio contact with the approaching air unit (for which purpose each individual detachment had a code designation) and directed it to the most important targets. These targets were specified to the detachment by the locally responsible infantry battalion or regimental commander or by the senior artillery commander.

Later, when the air situation became increasingly critical in the eastern theater because of the recovery made by the Russian air forces, forward air control detachments were also established for fighter forces. These detachments were employed in current areas of main emphasis in friendly or hostile air operations, and were

assigned under the locally responsible fighter commands at the front. If the general commanding an air corps proceeded to the front areas in order to direct an operation personally, he was able to transmit his orders through these control detachments to his airborne units.

Other means used to identify targets included the use of marking shells producing colored smoke and fired by artillery guns or of directional signals placed on the ground.

The danger of striking friendly troops with bombs was particularly acute during rapid advances on the ground or when bomber units were committed in high altitude bombing missions over the battle area. For this reason the use of bomber forces in missions over the actual field of battle was authorized only if easily recognizable terrain features existed by which it was possible to find the target. During massed air attacks designed to create a breach in the enemy defenses for the attacking ground forces, it was also essential to designate particularly salient terrain features as boundaries in order to avoid wrong bomb releases. It was not a German practice to withdraw troops from the line as a protective measure during air strikes.

A particularly difficult matter was that of preventing wrongly placed bombings when the situation on the ground became fluid. An attempt to solve this problem by establishing rigidly fixed safety lines for air action (also called rear boundaries for bomb releases) during forward movements on the ground failed. As early as the campaign in France the practice of establishing a daily rearward bombing line a day in advance proved a serious disadvantage in rapidly changing situations, and particularly when motorized surface units were involved. Very often the bombing boundaries established by the command were passed within a very short while by the troops on the ground who then had to halt their successfully proceeding operations or risk coming under attack by their own air forces. On the other hand, if German forces were held up by enemy resistance or even when they themselves came under attack, their air forces were unable to support them because the enemy forces were on the friendly side of the bombing line.

With the beginning of the Russian campaign the rapid advance of armored forces promptly illustrated again the impracticability of establishing bombing lines. Consequently, the system was discontinued

in the late summer of 1941 and replaced by a system of identification markings. In cases of uncertainty air units approaching their assigned target area were required to signify their intention to attack. This was done by means of preestablished light signals, and if German troops were within the area they were required to disclose their presence, also by means of preestablished light signals. In addition, air forces were required to employ every means possible to identify troops on the ground if any doubt existed about their identity. If there was no possibility of clarifying the situation even by means of low altitude air reconnaissance, the air unit in question was required to attack an alternate target.

Friendly troops, on the other hand, were required to identify themselves by means of light or smoke signals when called upon to do so. Rear elements placed cloth signals on their vehicles to identify themselves. Armored units were also required to place cloth signals on the tanks and also to identify themselves by means of smoke signals. The fact that these arrangements also benefited any enemy air force which might approach to attack was unimportant in 1941 because at that time the Germans had clear air superiority. The color of the light signals used changed every few days in order to prevent misuse by the enemy. The use of light and smoke signals proved highly satisfactory and such signals could be recognized even at great altitudes. In particularly difficult situations, however, it proved just as impossible to completely prevent erroneous bombings of friendly troops as it did to prevent friendly troops sometimes coming under fire from friendly artillery.*

As mentioned previously in this study, directives from the Wehrmacht High Command ordering air support for army operations did not (down to the level of air fleet-army group) prescribe whether such support was to take the form of air action to seal off the battle area, of air action directly over the battle, or a combination of these two types of action. Agreements on this subject were usually worked out at the air fleet-army group or air fleet-army level. The latter case applied when the army group had specified which of its armies

---

* Appendix 20 in unpublished appendices of USAF Historical Study No. 163, Karlsruhe Document Collection, consists of a letter from VIII Air Corps to Army Group Center dealing with this subject.

was to receive air support.

The basic principle here was that airpower was to be employed in only one area of main effort at any one time within the zone of operations of any one army group. This implied that out of the two or three armies controlled by an army group headquarters only one army at a time could receive air support. The only exception here was the rare case of an air fleet having available two high level commands (air corps, air division, or other air commands) each controlling an appropriate number of air units.

In many cases agreement as to what type of air support was required was reached at an even lower level, namely between the supporting air corps and the army to be supported. If direct air support was required in the form of action over the battle area itself, the appropriate army would inform the air corps which of its corps was to be supported, a matter which naturally depended entirely on the current situation. However, the corps headquarters thus designated had authority to delegate its powers to one of the divisions under its control. The air combat missions themselves then were executed in accordance with the principles laid down in paragraph 125 of Air Field Manual No. 16, which stated that, "the commanding officer directing ground operations will define the purpose to be achieved by the air action while the air corps will direct the execution of the air mission."

Once all the preliminary arrangements were made, all requests for air strikes went from the army corps involved (or, if a division was designated to receive the air support, from this division) to the air corps. It was left to the discretion of the army command thus involved either to formulate the requests itself or merely to pass on the requests as formulated by the units it controlled, such as its regimental or battalion or artillery commanders.*

---

* The sketches included in the Appendix as Appendix 14: Graphic Presentation of Air Support Action (Schematische Darstellung der Luftwaffenunterstuetzung) and Appendix 15: Example of Direct Army Support (Beispiel einer unmittelbaren Heeresunterstuetzung), are offered as examples of the types of action just discussed.

Since the targets to be taken under attack on the field of battle were usually mobile and remained in evidence for only a short while, the time between detection of the target and the actual strike against it had to be kept as short as possible. In critical situations the method had to be adopted frequently of holding air units constantly ready for immediate action. In order to insure that flying personnel would have their necessary rest, however, acute alerts and alerts under which units had to be able to take off at very short notice were only to be ordered if it was actually to be assumed that they would have to go into action soon. Units which were too often held under false alerts, usually did not take an alert very seriously after a while. The result was that when they were actually needed in a hurry, preparations for takeoff took an exceptionally long time. In order to be ready for all contingencies during critical periods it was often sufficient to hold only elements of a unit under immediate alert.

When it became necessary occasionally to dispatch bomber units on missions directly over the field of battle, these units usually required twice as long as single-engine ground-attack and dive-bomber units to prepare for takeoff.

The timely issue of orders was a matter of prime importance. Warning orders served the primary purpose of allowing the unit time to take care of preparations which required the most time, such as tanking, and the loading of bombs, and at the same time informed the unit when it would probably have to take off.

The operational order itself contained a number of items, the first of which were information on the tactical situation on the ground in the prospective area of operations, and on the air situation and weather conditions, together with a weather forecast. The targets to be taken under attack had to be designated with particular care and precision. It was essential to use large-scale maps, if possible 1:25,000 or 1:100,000 for this purpose. It was found advisable to state the purpose of the mission against the eventuality that the unit might have to divert its action to alternate targets. Details concerning the execution of the mission were to be left as far as possible to the unit commander, with due regard to the abilities and experience of the specific officer concerned.

Critical situations frequently created the necessity for missions

to be flown immediately after daybreak, and thus at a time when adequate target data was not yet available from the army command concerned (through the air signal-liaison detachment), and when it was not yet possible to surmise weather developments in the front areas. In such cases it was found advisable to instruct the unit intended for commitment to carry out target and weather reconnaissance in the target area. The unit thereupon dispatched an advance force of two or three planes on an armed reconnaissance mission in the front area, during which the force could attack small targets and radio the necessary tactical data to its parent unit, which was ready to take off.

If fighter escorts were to be provided, the precise point, time, and altitude at which the attacking unit would meet its escorting fighters had to be stated. In most situations only dive-bomber units needed fighter escorts; personnel in the ground-attack arm had limited fighter training and were able to protect themselves, one squadron attacking the assigned target while another stood by to protect the attacking unit. If heavy ground fire was encountered it was sometimes necessary to detach elements of the attacking force to take first the firing antiaircraft gun batteries under attack. In many cases it was possible to arrange with friendly artillery batteries to fire on the enemy antiaircraft batteries while the air strike was being executed.

In cases where individual air groups, which were part of a single air wing, were committed, it was sometimes found advisable for corps headquarters, in order to avoid misunderstandings, to issue orders directly to each group participating in the attack, informing air wing headquarters accordingly. Orders from corps headquarters stated either that the units participating in the air strike were to take off on their mission "as soon as possible" or that they were to take off at a specified time.

While on the approach flight to the front the unit had to rely exclusively on radio communications for contact with its base on the ground. The Luftwaffe did not employ a system such as that applied by the Western Allies, in which the parent headquarters directed the operation through control points at the front. Any changes which occurred in the air or ground tactical situation, or modifications of the mission order, had to be transmitted to the unit in flight by radio

messages from its control station on the ground.

If a strike was to be directed by a ground control point in the front area, the unit in flight established contact with the appropriate control detachment which directed it to the assigned target or targets. As a rule the ground forces received no notification concerning the type and timing of the mission, since the relaying of such information to troops in position in the foremost line was usually a problematical matter. Agreements as to the precise timing of an air strike were arranged well beforehand only if the plan provided that the ground forces were to exploit the effects of the air strike. In special circumstances a bomb release schedule was established for the attacking air units and coordinated with the fire plan of the ground artillery.

After the air unit had returned to base, the locally responsible operations officer reported the results of the strike to air corps headquarters. If further missions were waiting for execution, the report included information on when units would be ready to take off again and the presumed number of aircraft which would be available.

A few examples selected from the voluminous records available on the subject will serve to illustrate what has been said in the above discussion.

On 13 May 1940, the fourth day of the campaign against France,* the German Army High Command decided to dispatch forces across the Meuse River in a surprise movement at Sedan in order to create conditions which would enable the armored units to breach the French main line of resistance. Air support was a decisively important requirement in this operation.

Orders to the 1st Panzer Division to cross the Meuse contained the following information on the plans for air operations in support of the action:[27]

---

* Editor's Note: The campaign in the West has been covered in the unpublished manuscript by General der Flieger (Lieutenant General) Wilhelm Speidel on the German Air Force in France and the Low Countries, 1939-40, in Karlsruhe Document Collection.

> On the 13th of May the point of main effort of our Western Offensive lies in the sector of Group von Kleist. Almost the whole of the German air force will support this operation. By means of uninterrupted attacks lasting for eight hours the French defenses along the Meuse will be smashed. This will be followed by an assault across the river by Group von Kleist at 16.00 hrs. and the establishment of bridgeheads.

The army support mission included direct air support in the form of close support of army forces on the field of battle and indirect support in the form of action to seal off the battle area.

Concerning the indirect support for the Army at Sedan, the Intelligence Reports by the Office of the Commander in Chief of the Luftwaffe contained the following passages:

> Continuous attacks by strong forces within a confined space neutralized the enemy defenses, prevented the forward movement of enemy forces for a counterattack, and thereby made it possible for the spearhead units of two armored divisions and of one infantry brigade to cross the Meuse River at two different points between Charleville and Sedan.
>
> The drive through permanent fortification systems of the enemy at Mezieres and Sedan was carried forward to a depth of 12 miles in a southward direction and our forces crossed the Ardennes Canal westward. Under the pressure of the German drive, which is supported by strong air forces, the enemy forces are retreating in disorder . . . .

Of the numerous occasions on which airpower was employed against permanent type fortifications, the air operations against the Fortress of Sevastopol, on the Crimea Peninsula, in June 1942 merit special mention. The fortress had been developed in accordance with the most up-to-date experience and with the use of the most modern means available at the time, and action to reduce it presented entirely new and difficult problems for the attacking air forces. Action had to be taken to destroy the heaviest types of armor-protected gun batteries, battle positions, and other fortification works, including innumerable bunkers and field defenses in the midst of a maze of trenches, and battle positions built into the rock walls of canyons.

The whole operation was based on carefully planned preparations by the Luftwaffe and the Army. From November 1941 on the fortress had been enveloped on the land side. Air reconnaissance, by means of normal and stereo photography, had recorded all permanent and field type fortification works, artillery and mortar positions, alternate positions, antitank ditches, assembly areas for reserves, and command posts.* In the planning of air attacks this provided the best data conceivable for the VIII Air Corps, which had been moved into the Crimea from the central sector of the eastern front specifically because of the wide experience this corps had in the type of action required. In the execution of its missions against Sevastopol, the air corps was responsible directly to the Commander in Chief of the Luftwaffe.

The air forces available for the operation comprised 390 bomber, dive-bomber, and fighter aircraft, which corresponded to a daily operable strength of approxima ely 250-300 aircraft.

Supported in its views by General von Richthofen, in command of the VIII Air Corps, Eleventh Army Headquarters expected that, in addition to the actual destruction achieved, the air attacks would wear down the morale of the enemy troops. For this purpose, plans provided for four days of uninterrupted air attacks and artillery fire against the Russian fortifications to precede the infantry attack. The fire plan provided in detail for the following action: 1) Simultaneously with the first artillery concentration, air forces each day were to attack enemy reserves outside of artillery range; 2) twin-engine units were to maintain continuous day and night attacks against supply installations in the far enemy rear, and against airfields and shipping; 3) in systematic action coordinated with the artillery, air forces were to neutralize the enemy artillery and mortar batteries; 4) air forces were to destroy targets, such as coastal artillery batteries, which the ground forces could neither attack nor take under observation; and 5) artillery reconnaissance aircraft were to keep the enemy artillery under constant observation. On the first day of the infantry attack, main emphasis in air operations was to be on support for the LIV Corps. Then emphasis was to shift to the XXX Corps or to the VI (Rumanian) Mountain Corps in accordance with developments in

* See Appendix 16.

the tactical situation.

Favored by good weather, the first air mission was flown on 2 June 1942 and the air attacks then continued according to plan until 6 June.*

On 7 June, when the infantry jumped off to the attack on the north flank, dive-bomber units from the early morning on maintained continuous attacks against the enemy defense positions in the line of advance of the attacking infantry. It was found during this action that the preceding fire action had by no means destroyed the enemy combat morale. Hopes failed to materialize that the attack on the ground would carry through to the shores of Servernaya Bay, and most of the heavily armored fortification works in the outpost area were found to be undamaged.

The outcome was that the infantry attack in this sector alone continued up to 20 June. Inch by inch the infantry had to battle its way forward. Committed as ground-attack aircraft and using bombs and weapons fire, dive-bomber aircraft prepared the way for the infantry. Fighter aircraft maintained continuous patrols over the area and attacked fortified field and artillery positions and troop columns with bombs and weapons fire. Some of the air units engaged flew as many as eight combat missions daily.

The severe nature of the infantry fighting influenced the army command to request that the Luftwaffe should cease action against the enemy artillery and concentrate exclusively on bombing attacks in direct support of the infantry attack. The results achieved in certain specific actions decisively influenced the outcome of the whole operation, as was the case with a mission flown by 1st Lieutenant Maus, who scored two full hits on armored turret "Maxim Gorki," putting it completely out of action./ This single incident considerably

---

* See Appendix 17.

/ Editor's Note: This battery was located directly south across the narrow peninsula from Sevastopol itself. It formed the extreme right wing of the inner ring of defenses around Sevastopol, as well as commanding the sea approaches to the city from the south and east.

accelerated the advance on the right flank.

On 11 June the south flank forces joined in the attack. Here again, main emphasis in air operations was on strikes at targets immediately ahead of the foremost infantry units.

On 29 June came the final drive at the hard core of the whole fortification system. To divert the attention of the defenders and at the same time to break their resistance, all air units available, including reconnaissance aircraft, combined in two hours of concentrated bombing against the Sapun Hills immediately preceding the infantry drive on the ground. These final attacks were successful and the infantry gained a foothold on the summit in the first attack and then speedily gained ground westwards and southwestwards. Completely worn down by the incessant air attacks, the enemy forces were able to continue resistance at only a few points and for only a short while. In spite of bitterly tenacious resistance, the fortress finally succumbed under the combined effect of massed air attacks and heavy artillery fire.

Flying a total of 23,751 sorties, the air units delivered 20,000 tons of bombs on targets. Being based so close to their targets, units in some cases were able to complete their missions within the short space of twenty minutes. The decisive factor in the whole operation was the contribution made by the participating air forces, which prepared the way for the infantry advance on the ground by placing bombs on the enemy immediately in front of the foremost German forces.

The airborne operation to seize the island of Crete, which was carried out by the XI (Airborne) Air Corps, consisting of two divisions (one paratrooper and one air-carried), constitutes an excellent example of air support of an airborne operation. For the transportation movement the XI Air Corps was assigned a special air command with a large number of air transport groups totalling approximately 500 Ju-52 transport planes, plus tow planes with freight gliders.

The operation commenced on the morning of 20 May 1941. Landings were effected at three points: at the Maleme airfield, close to the city and port of Khania and Rethymnon, and, in the afternoon,

at the Iraklion (Candia) airfield.

The mission of neutralizing the ground defenses during the parachute jump and of providing close air defense was assigned to the VIII Air Corps, which had for the purpose three bomber wings, one dive-bomber wing, one single-engine fighter wing, one twin-engine fighter wing (with two-seater planes), and two reconnaissance squadrons. The bulk of the air units operated from airfields in the Athens area and on the Peloponnesus; some elements came from Italian airfields in the Dodecanese, from Rhodes, and the Scarpanto islands.

The first paratroopers made their jump so as to reach the ground almost simultaneously with the delivery of the first concentration of bombs by the bomber aircraft, taking advantage of the newly created bomb craters for cover. Other air units were detailed to neutralize the enemy antiaircraft artillery in the vicinity of the air-drop area, and to attack barracks and tent camps in order to prevent interference by the enemy reserves with the landing of the transport planes. Single- and twin-engine fighter units provided cover for the troops during the landing. Since the transport planes available at the time could not carry heavy weapons, the VIII Air Corps had to provide fire support in the fighting which then followed on the ground until the first naval units could arrive.

The air combat action in support of the airdrop was so effective that only seven of the 500 Ju-52 planes used in the first landing were lost.*

Air support of an amphibious operation is best illustrated by the seizure of the Baltic Islands in September 1941.†

---

* Editor's Note: Considerable material is available in the Karlsruhe Document Collection (G VII 8, G VII 8a) on the operation in Crete; also, the unpublished manuscript by Major Pissin in the German Historical Monograph series on the conquest of Crete.

† See Appendix 18.

Responsibility for operations was assigned to the Commanding General, XXXXII Army Corps, who was given command authority for the purpose over air and naval elements. The air forces thus assigned comprised three bomber groups, one twin-engine fighter group, one single-engine fighter squadron, and three naval reconnaissance squadrons, controlled by a special air command.

At the request of the Army and contrary to the desires of the Luftwaffe, plans provided for the first attacks, against the east coast of Muhu Island, to be launched during hours of darkness on 14 September. In this case the attack had to take place without direct air support until daylight.

Landing operations having been delayed by bad weather, a critical situation resulted. Enemy artillery and antiaircraft inflicted heavy losses by flanking fire on the assault boats and on the infantry crossing the beach. Unfortunately, German supporting fire had little effect, since the guns positioned on the mainland were handicapped by poor weather for observation. It was only after air units had neutralized the enemy batteries that the infantry, with direct air support, succeeded in establishing a beachhead during the morning. Indeed, it was only with continued effective air support that the island was captured, and that measures by the enemy to reinforce the island's forces, and later to withdraw, were thwarted.*

The Russian counteroffensive beginning 8 July 1943 offers a good example of air support of army defense operations.

This counteroffensive was launched against the German Second Panzer Army and Ninth Army (the forces of the former were holding the Orel River bulge while those of the Ninth Army were still engaged in a southeastward drive) and developed into a situation which gave cause for grave concern.† When a Russian armored brigade participating in the counterattack broke through the German defenses and succeeded in establishing itself athwart the only rail and the only

---

* Unpublished manuscript in the German Historical Monograph series by General Hermann Plocher on the Luftwaffe in the campaign in the East.

† See Appendix 19.

road route on which the two German armies relied for their supplies and replacements, the threat of a catastrophe even greater than that of Stalingrad appeared imminent.

Plans for the German Zitadelle* offensive had provided for the Ninth Army, serving as the northern prong in a double envelopment of the Russian forces at Kursk, to stage an all-out drive towards the southeast from the Orel River bulge area. Prior to the offensive, the German Command had foreseen the possibility of a Russian counterattack and had realized the serious danger inherent in such a Russian move. Two days before the German offensive began Hitler addressed the commanding generals of the armies and corps which were to participate. In his address, which was held in a hall on the Jaegerhoehe hill near his headquarters in Loetzen, Eastern Prussia, he spoke in great detail about this latent threat. He declared that if the Russians did launch a counterattack he would throw the last available aircraft into action to ban the threat.[28]

In actual fact the First Air Division, committed in the Orel River bend area, did receive large reinforcements after the Russian counteroffensive began, and reinforcements continued to arrive until the Sixth Air Fleet declared that it was unable to support more units with supplies. In very heavy air attacks the Luftwaffe actually succeeded time and again in preventing a Russian breakthrough, a contingency which threatened once or twice each day. This enabled the command on the ground gradually to withdraw all forces in some semblance of order from the bulge, and to straighten out the front lines.

The final report on the Battle of the Orel River Bend Area, in characteristically sober language, pointed up the achievement of 1st Air Division:[29]

---

* Editor's Note: Operation Citadel was conceived by the Wehrmacht, not as a major offensive looking toward complete victory but as a means of further wearing down the Soviet Union to the point where, as Field Marshal von Manstein put it, the Soviet Union "would tire of its already excessive sacrifices and be ready to accept a stalemate" (Manstein, Lost Victories, p. 443).

Particularly impressive in these actions are the figures showing the results achieved by the 1st Air Division, which tirelessly continued its support mission, alternating between support for the Ninth Army and for the Second Panzer Army, in the form of air combat missions and strikes in direct support of current operations on the ground.

The air division, which through its action decided the issue in many highly critical situations,* dispatched its units in the execution of a total of 37,421 sorties, shooting down 1,735 enemy aircraft--1,671 of them by fighter units alone--against a loss of only 64 of its own planes. In addition, the air units put out of action 1,100 tanks, 1,300 wheeled and tracked motor trucks and other vehicles, and numerous artillery batteries.

Delivering more than 20,000 tons of bombs on targets, the air forces also inflicted heavy losses on the enemy in personnel, railway rolling stock, and supplies. During the Battle of the Orel River Bend Area units of the air division at times flew as many as five or six missions on a single day.

Events in the past years of warfare had revealed clearly the importance of the development of power concentrations in offensives. In a proper appraisal of these past events, the German supreme command should have realized by then how immeasurably important the development of airpower concentrations was in operations to repel enemy offensives. Besides concentrating all tactical support units available, it would have been necessary in the first place to break with the old system of distributing the multi-engine bomber forces among the various air fleets. Through firm and direct control over these forces, the supreme command would have had available a really effective instrument of power with which to exercise a decisive influence in the needed areas. This admittedly would have necessitated a change in the existing command organization, a change which was in any event long overdue.

The preceding passages are not intended to support any idea

---

* Underscored by author.

of increased emphasis on army support air activities. What is meant here is that concentrated air attacks of the type referred to should have been launched only during limited periods when the tactical situation on the ground made them appear necessary, as was the case at the opening of large-scale Russian operations. However, the German Command failed to learn the obvious lessons of Orel. Instead it continued the system in which the flying forces remained too widely distributed. *

Under conditions as they existed towards the end of 1944, however, with steadily expanding frontages and with Russian armored forces frequently breaking through the lines in a number of wedges, the only thing which could have relieved the situation would have been the employment of air forces concentrated firmly in sharply defined areas of main effort.

That enemy armor was time and again successfully neutralized by German airpower is undeniable. The 1940 campaign in the west proved that the airplane was a most effective weapon against tanks. Indeed, it was shown that a well prepared operation by armor could be made to fail primarily through airpower. For example, during the drive of General Guderian's XIX Panzer Corps towards the Channel Coast, General de Gaulle's armored force, in the plains of Laon, struck in the flank and penetrated to a considerable depth. That de Gaulle had achieved an initial success is undeniable, but this threat was averted largely by German dive-bombers which put most of the French tanks out of action. 30

In 1943 the introduction of specially equipped aircraft carrying guns for antitank action again produced very favorable results. Thus, the Luftwaffe's IV Antitank Group at Belgorod on 8 July 1943, during the Zitadelle Offensive, completely repelled a Russian surprise attack in the strength of an armored brigade. The Russian attack was directed against the rear flank of the I SS Panzer Corps, under General Hausser, in other words against the rear flank of the Fourth Panzer Army. Under the command of Captain Meyer, the IV Antitank Group of the 9th Antitank Fighter Wing, comprising four squadrons, each with 16 Hs-129 aircraft armed with M. K. -101 30-mm guns, for roughly an

* See Appendix 21.

hour maintained squadron-size attacks which halted the Russian force and compelled it to withdraw to its jump-off positions. The attacking German aircraft set most of the Russian tanks and other vehicles on fire, and the German Fourth Army was able to continue its drive without interference. [31]

As the numbers of Russian tanks committed in the eastern theater continued to mount, successful action against them became a problem of life and death for the Army (handicapped in manpower and by a dearth of antitank weapons), and a mission the Luftwaffe was not able to avoid. [32]

However, in spite of all the success achieved in this field (for example, Colonel Rudel destroyed 519 Russian tanks), the number of Russian tanks destroyed remained too small, particularly in view of the fact that Russia's output in tanks was mounting steadily after the Luftwaffe had done nothing, or practically nothing, to interfere with manufacturing operations. This resulted in the impressive contrast of 150,000 tanks produced by Russia during the war to the German production of 25,000. [33] In addition, the Western Allies delivered large numbers of tanks to Russia.

The German bombs initially available for antitank action were hardly suitable for the purpose. Near hits, within only a few yards of a tank, usually did no damage at all. The situation only improved after development of the S. D. 4 antitank (hollow-charge) bomb. However, these bombs, as well as the newly developed antitank rocket weapons, reached the field at such a late stage as to preclude decisive effects.

In the circumstances obtaining in World War II, it must be admitted that the support of ground forces on the battlefield was a valid mission of airpower. This being the case, an appropriate command organization and appropriate special type combat units were necessary for such purposes. In order to produce really telling results, it was essential to commit airpower against tanks in concentration. What would have made this all the more feasible was the fact that, as a rule, larg-scale ground operations within a specific theater usually remain restricted to one or two segments of the front at a time. Main effort in air operations had to be adapted to the current main effort in operations on the ground. Very frequently

this was not done on the German side, since the high level army command concerned in each case did its utmost to prevent the withdrawal of air forces from its command zone when any such withdrawal was intended. This fact was admitted by Colonel Kusserow* in a postwar report of 2 September 1954. In the beginning of the Russian campaign, Colonel Kusserow wrote, the area of main effort on the ground was also the area of airpower concentration. Later, there was a departure from this principle, with a consequent parceling out of airpower to the detriment of efficiency and effectiveness. Usually this was caused by the requests and demands of the army commands on a scale impossible to justify from the standpoint of sound tactics and strategy. Nor could the measures taken in this respect be judged commensurate with the results achieved. [34]

In discussing the basic requirement that airpower must be employed only in concentration it must be admitted that in the far-flung areas involved it was always possible for a serious crisis to develop in a hitherto quiet segment of the front. In view of the general shortage of reserves on the German side such a crisis could produce disastrous results. Under such circumstances it would probably have been justifiable to leave a tactical air support force--possibly in the strength of approximately a group--stationed within the command zone of an army group as what might be called a local emergency reserve. However, all other air forces available within each theater of operations should have been concentrated for action at one decisive point.

Contrary to this basic principle, the available tactical air support units were distributed among the various front sectors in accordance with a more or less stereotype pattern. The outcome was that, purely from the urge to keep them busy, the units were committed continuously even when there was no possibility that their action could produce important results. In part, this tendency stemmed from the army commands concerned, in the belief that such action would weaken the enemy. From personal experience gained through five years spent in command positions at the front, however, the present author is aware that most of the air fleet headquarters also pursued this policy. At the close of each day air fleet headquarters

---

* Editor's Note: See pp. 95-96.

would examine critically whether all aircraft available had been committed often enough "in order to avoid the Commander in Chief of the Luftwaffe's taking away units." The examination rarely went into the question of whether circumstances justified the attacks carried out, or whether the results achieved were commensurate with the effort expended. For example, in a currently quiet segment of a front, the defense forces available to the enemy in that segment were not engaged in ground combat action, so that defensive fire from all weapons on the ground could be concentrated against the attacking aircraft. This resulted in excessive losses.

As a result of this urge to keep their forces occupied, the commands did not allow their units adequate time for rest and for training activities. Except when reequipping with a new type of aircraft, the units were constantly in action. And all this time no really decisive results were achieved in the actual areas of main effort in combat on the ground.

What the German side lacked was a system under which each theater of operations would have been under a joint command with detailed insight into the situation all along the line and having the necessary authority over both the army forces and the tactical air support forces to conduct operations commensurate with the situation. Instead, the air fleets committed in all theaters were under the Commander in Chief of the Luftwaffe, who had his headquarters far removed from the fighting fronts, while the various army groups were either under the Army High Command, also not within any one of the theaters but inside Germany, or directly under the Wehrmacht High Command. These top level commands were too far distant to have a precise knowledge of the real situation on the various fronts, and also were too heavily burdened with other responsibilities to give adequate time and attention to the situation.

The commitment of bomber forces in action over the actual field of battle on the ground was authorized theoretically only in exceptional circumstances--to create a breach in the enemy defenses for forces attacking on the ground, or in the case of an exceptionally critical situation. What actually happened becomes evident from a report by the last commander of the 1st Fighter Wing, Lieutenant Colonel von Riesen. He contended that, in reality, the Luftwaffe came to be "a means of combat of the army groups and armies."

Thus, the ground forces came to look on the use of all types of units of the Luftwaffe as the final solution to problems which were "strictly the field of ground-attack forces." The extreme was reached when units were required to commit four-engine bombers singly in low-level attacks on tanks, while fighter forces not dissipated in ground attack missions were compelled to contend with enemy forces greatly superior in numbers. "This outcome," observed Colonel Riesen, "was brought about by a command which had failed to grasp the extreme value of airpower in this war." Such wasteful and erroneous utilization of airpower led first to the loss of the war in the air, which in turn led inevitably to the ultimate fate of ground operations.[35]

The problem of what measures could have been taken to prevent this misuse of the bomber forces will be dealt with in the closing chapter of this study.*

The errors of organization and employment were intensified by errors and shortages in materiel. For the Luftwaffe did not always have available the proper weapons for direct air support on the battlefield. For example, the command failed to provide, prior to the beginning of the Russian campaign, for adequate supplies of fragmentation bombs.

The lack of suitable weapons for antitank combat action has been mentioned previously, and this lack was accentuated by the fact that the ground forces also were inadequately equipped with antitank weapons.

At all events, it may well be that in future war rocket development will reduce or entirely do away with the necessity to commit air forces in action over the actual field of battle, which as a rule is an uneconomical use of airpower.

---

* This problem is dealt with in a report in Appendix 33, in unpublished appendices of USAF Historical Study No. 163, Karlsruhe Document Collection.

Chapter 5

THE RATIO OF ARMY SUPPORT TO OVERALL AIR OPERATIONS

In order to arrive at a just appraisal, it is necessary to determine what share of the overall air effort was expended in action supporting the operations of the Army on the ground, whether such action was to seal off battle areas or was in the form of direct support over the field of battle. Although available sources[1] do not provide an exhaustive presentation of the subject, they do provide certain indications. They reveal to what extent operations in support of the Army resulted increasingly in a neglect of the other missions of airpower, which were usually just as important, if not more important, than direct support.

The Polish Campaign, 1939

The 8th (Military History) Division of the Luftwaffe, in a study entitled "Survey of German Conduct of Air Warfare" (Ueberblick ueber die deutsche Luftkriegfuehrung), stated that,

> In the battles in Poland the independent (operational) air force made its first appearance as a weapon which could decide the outcome of a campaign. Its missions in this role necessitated a clearly defined concentration of effort to secure the quick defeat of the enemy and in detail prescribed the following tasks:
>
> a. Destruction of the Polish air forces, their ground service organization, and the Polish air armament industries.
>
> b. Support of army operations on the ground in order to insure a quick breakthrough on the ground and a speedy advance by the ground forces.
>
> c. Attacks against Polish military installations and armament industries in Warsaw.

For the performance of these tasks two air fleet headquarters, with

an operable strength of 1,558 first line aircraft, were available.*

In the first few days of September 1939 483 aircraft were committed in combat missions against the enemy air forces. Units flew 4,806 sorties of indirect army support during the drive across the Vistula-San line, and 3,740 sorties of direct support during the border battles and the fighting which then followed. The ratio of aircraft employed in strategic missions to those employed in missions of direct support for the Army was thus 5:4.

The Polish side had available 400 operable first line aircraft. Within two days the German air forces established air supremacy over all Polish territories. The attacks against the Polish air forces compelled them to displace to alternate airfields and rendered them ineffective. The Polish command was no longer able to employ the air forces still available in uniformly directed operations.

These circumstances made it possible for the German command to operate in support of army operations on a larger scale and at an earlier stage than had been anticipated. From the first day of the campaign all Polish concentration movements came under systematically planned attack directed at rail depots, loading operations, and points of interdiction along traffic routes. In some cases the movements of Polish troops were rendered completely impossible.

Destruction of the Vistula River bridges and other crossing facilities prevented the withdrawal of the Polish forces and made a large battle of envelopment possible. Continuous combat action by tactical air support units against the retreating Polish forces facilitated and accelerated the German advance on the ground. The air units thus committed supported the ground forces in their drive through fortified lines, broke up enemy troop concentrations, and

---

* This number includes only the strengths available in units under command by the Commander in Chief of the Luftwaffe, not the reconnaissance and liaison units allocated to the Army. The forces under the CINC, Luftwaffe, were organized under the two air fleets: 8 strategic reconnaissance squadrons, and 21 bomber, 8.5 dive-bomber, 5 twin-engine, and 5 single-engine fighter groups.

destroyed pockets of resistance and Polish units spearheading attacks. All of these operations were carried out in close coordination with action by the ground forces.

The large-scale attack by the combined forces of the First and Fourth Air Fleets against the fortress of Warsaw on 15 September 1939 broke the will of the defenders to resist and brought the "Battle for Poland" to a quick end.

Operations by the Luftwaffe thus contributed in a decisive measure towards the successful conclusion of the war against Poland. Success was due to the following factors: 1) The surprise effect achieved in the attack; 2) properly planned mass attacks and developments of power concentration; 3) the lack of proper planning in the Polish direction of air operations; and, 4) German superiority in manpower and materiel.

The Campaign in the West, 1940

The study by the Military History Division of the Luftwaffe quoted above reported on the 1940 campaign in the west:

> With the opening of the campaign against Holland, Belgium, and France on 10 May 1940, our air forces in the west . . . /were/ committed in new offensive operations. Consonant with past experience their assigned missions required execution of the following tasks:
>
> a. Destruction of the enemy air forces and their resources.
>
> b. Indirect and direct support of army operations on the ground.
>
> c. Combat action against enemy ports and enemy ship movements.

The Second and Third Air Fleets were given the responsibility of the accomplishment of these missions. Actual Luftwaffe strength was 5,142 aircraft, with 3,824 of these in combat-ready condition, and consisting of 1,120 bomber, 1,665 fighter, 501 reconnaissance,

342 dive-bomber, 42 ground-attack, and 154 seaplane aircraft.*

Opposing German airpower were the Allied (including Belgian and Dutch) air forces, with a total strength of approximately 6,000 aircraft, roughly 3,000 of them based on continental airfields.[2]

The principal emphasis at the beginning of the campaign was against the air forces ground service organizations in Belgium, Holland, and northern France. These attacks destroyed the Belgian and Dutch air forces and seriously weakened the Franco-British air forces. The result was the rapid establishment of German air supremacy, permitting the Luftwaffe to give increased air support to the ground forces. Airborne operations in Holland and Belgium, marking a new departure in warfare, made possible a rapid advance by German ground forces. Following the defeat of enemy air forces, the demoralizing dive-bomber attacks had a decisive influence on the rapid and successful operations. Indeed, the drive to the Channel Coast was made possible by the protection of both flanks of the drive by air reconnaissance and heavy commitments of combat airpower. The impression of irreversible German air superiority must be considered as an important psychological factor contributing to the vitiation of the French will to continue the struggle.†

Nor did the Luftwaffe neglect the sea. Operations of bomber forces reached a high point during the enveloping maneuvers in the Dunkirk area. Enemy naval and merchant ships were taken under continuous attack with bombs and mines.

Once again the system of concentrated and logically directed operations in air warfare had been vindicated. In independent action to establish air supremacy, in operations to destroy large enemy

---

* These figures are taken from a compilation prepared by the Supply Branch from the operable strengths given in unit strength reports.

† See Appendix 23. This sketch shows how a combination of action in direct support of the army and of action to seal off the battle area made the drive by armored forces to the Channel coast possible in the west. In direct support missions dive-bombers crushed enemy resistance in the line of advance on the ground, while bomber forces took action to prevent the movement of enemy forces against the flanks of the German armored force.

industrial areas, and in missions of indirect and direct support for the Army and the Navy the Luftwaffe achieved decisive results.

The Balkan Campaign

With the opening of the Balkan campaign on 6 April 1941 main emphasis in the German conduct of air warfare shifted from the western to the southeastern areas of Europe. The mission directive of the Luftwaffe in this campaign called for, a) effective support for the ground forces through air combat action on the field of battle and through action to neutralize enemy resistance in the rearward areas; and b) execution of an airborne operation aiming at the capture of the island of Crete.

On 15 February 1941 Yugoslavia had available a total of 357 aircraft suitable for military purpose. Of this number 32 were reconnaissance, 177 bomber, and 154 fighter aircraft.[3] In contrast, the German Fourth Air Fleet was assigned one strategic reconnaissance squadron, one bomber wing, seven dive-bomber groups, two twin-engine fighter groups, seven single-engine fighter groups, plus three single-engine fighter squadrons.[4]

Against the numerically weak air forces available to the enemy, the Fourth Air Fleet, assigned responsibility for the conduct of air operations in the campaign, had uncontested air supremacy from the very outset. Thus, quick and decisive results were achieved in both Greece and Yugoslavia.

Neither tactical nor operational surprise was achieved in the operation to seize Crete. Here again, the success of the airborne operation was predicated upon clear air superiority over the enemy. The success of the whole operation was made possible through the commitment of paratrooper forces and of mountain infantry units, whose victory on the ground was largely due to support from air transport groups and from the tactical units of the VIII Air Corps in the form of continuous air combat action.

The Russian Campaign

The Eastern Theater in 1941. Consonant with past experience, operational plans for the Luftwaffe established the following air missions: a) Destruction of the enemy air forces; b) support for the Army by means of combat action against enemy movements on road and rail routes, and by direct support on the battle field.

The Fourth, Second, and First Air Fleets, and elements of the Fifth Air Fleet were assigned to accomplish these missions. Out of a total actual strength of 5,892 aircraft available to the Luftwaffe, of which 3,701 were operable,* the air units committed in the eastern theater had a total strength of 2,150 first line aircraft. These were organized in 21 strategic reconnaissance and 51 tactical reconnaissance squadrons, and 31 bomber, 8 dive-bomber, 1 1/3 ground-attack, 2 twin-engine, and 19 single-engine fighter groups.[5]

On the basis of radio intercept reports the Soviets were assumed to have twice this strength in aircraft, but their recorded losses revealed in a very short while that they must have had a much larger numerical strength. For the first time the German air units thus entered a campaign with a numerical strength inferior to that of their opponent.

Throwing everything available into the action, the Luftwaffe struck its first surprise blows at the Russian air forces and by evening of the second day the Soviets had lost 2,582 aircraft.[/] It was

---

* This average operable strength of 3,701 aircraft comprised 593 reconnaissance, 1,030 bomber, 302 dive-bomber, 130 twin-engine fighter, 1,271 single-engine fighter, 231 transport, and 144 seaplane aircraft.

/ Editor's Note: "We succeeded in gaining air supremacy in the first two days, helped by excellent air photography. Reports of enemy aircraft destroyed in the air or on the ground totalled 2,500; a figure which the Reichsmarschall at first refused to believe. But when he checked up after our advance he told us our claim was 200 or 300 more than the actual figure" (Field Marshal Albert Kesselring, Kesselring: A Soldier's Record /New York, 1954/, p. 98).

thought on the German side that this would create a parity in airpower. Thereupon the heavy bomber units were committed in support of the ground forces and contributed largely towards the successes achieved on the ground. Air strikes were directed primarily at all traffic installations and highways in the enemy rear. The purpose of this action was to prevent withdrawal of the enemy forces into the deep rear to establish themselves behind the Dnepr and Dvina Rivers. During the battles of envelopment the objective was to prevent the approach of enemy forces aiming at relieving the enveloped Soviet armies through an attack from the outside, and at the same time to frustrate attempts of the pocketed armies to break out.

However, even in the June-December 1941 period the German air forces were unable to establish continuous air supremacy, and the frequent displacements combined with resupply difficulties resulted in serious attrition. Soviet losses were heavy, but not heavy enough to bring the campaign to a close. Although the Luftwaffe had destroyed 20, 392 Soviet aircraft, it was unable completely to neutralize Soviet airpower. The number of aircraft available was simply too small to enable the Luftwaffe to furnish support at all points where support was required. Effective counterair action concurrently with air action in support of the ground forces was impossible.

Indeed, developments in 1941 took a course which was to prove fateful for the Luftwaffe. The large size of the theater of operations in the east, and the crushing superiority of the enemy ground forces over the German side made it imperative to employ German airpower almost exclusively from then on in missions of direct support for the Army. If Army demands for air support were to be met, adequate air forces were not available for action against targets of a type the destruction of which might have served to balance Russian numerical superiority in favor of the German Army, as, for example large Soviet tank factories. Practically speaking, the Luftwaffe now had to restrict itself almost exclusively to only one mission, that of supporting the Army.

In a study prepared during the war, the Military History Division of the Luftwaffe General Staff discussed this subject in some detail. Even in 1941, as the study pointed out, the outstanding feature of air warfare in the East was the preponderance of Luftwaffe operations in support of the Army. Indeed, it soon became patent that the

ground forces, confronted with forces superior in numbers, could make good progress only when attacks were supported by the Luftwaffe. In recognition of this, Hitler issued a directive to the effect that large-scale operations by the Army were only to be initiated when full support by the Luftwaffe was ensured. This general condition, coupled with the mobile warfare which prevailed up to November 1941, required the commitment of almost all air units for close support, leaving only weak elements for "missions of a strictly strategical nature." The study concluded that if the number of aircraft and missions flown against Moscow be compared with the magnitude of the Anglo-American bombing effort against Germany, it must be concluded "that our strategic attacks cannot have been expected to produce decisive results."[6]

Circumstances were similar in the field of rail interdiction operations, from which the German Command had expected results on a strategic scale in view of the widely meshed Soviet railroad system and its low capabilities. Here again, however, the forces available for the purpose proved far too small for the size of the mission in the wide expanses of Russia. In the first few weeks of the campaign German rail interdiction attacks admittedly had an exceedingly hampering effect on the enemy, particularly during the large battles of envelopment. But the hoped for lasting results failed to materialize. The effects of Luftwaffe rail interdiction attacks remained locally restricted and, what is more important, only temporary. This was so because the Soviets developed completely unexpected and astonishing capabilities in the repair of damaged rail routes within inconceivably short spaces of time. Realizing the immense importance of an intact rail network for their conduct of operations, they furthermore soon commenced defending all of their rail depots, including those of small size, with antiaircraft artillery, mounted light antiaircraft guns on all railway trains, and with fighter units stationed along the routes, so that German units committed in rail interdiction missions soon began to encounter strong defenses.

The operations of Luftwaffe fighter forces also soon showed that the units available were far from adequate to secure air superiority--not to mention air supremacy--in all parts of the enormous expanses of the eastern theater. This obtained in spite of the fact that German fighter forces were far superior to the Soviet units in training, combat morale, and the quality of their equipment. It was

only through a firm concentration of fighter forces over the areas of main effort in ground operations that it was possible to achieve locally restricted and temporary air supremacy. In other areas of the theater, which at such times had to be stripped of fighter forces, German ground forces, who naturally could only judge the situation from their own limited viewpoint, found cause to complain about Soviet air superiority, because the resounding success achieved in annihilating attacks at the beginning of the campaign had secured for the Luftwaffe air supremacy for a few weeks all along the line.

Combined with aircraft deliveries from the Anglo-Americans, the large manufacturing capabilities of their aircraft industry had enabled the Soviets to replace within an astonishingly short time the losses they had suffered at the beginning of the campaign. This enabled the Soviets to maintain lively air activities, restricted almost entirely to action at the front in support of their ground forces. Soviet air attacks against targets far in the German rear were a rare occurrence, and the Soviet Command desisted entirely from operations of a strictly strategic nature.

German reconnaissance activities suffered under the same handicap of inadequate forces for the various areas, and this applied particularly to strategic air reconnaissance, in which field main emphasis was on rail reconnaissance. It would have been necessary to patrol the main rail routes in their entire length at least twice daily, and to ascertain the amount of traffic in large rail depots by means of air photo reconnaissance at least once daily. The lack of an adequate number of units made this impossible. A reconnaissance service of this type would have furnished data from which the higher level commands would have been able to determine with considerable reliability whether the traffic detected at any given time represented normal military and civilian transportation movements or whether large troop movements were taking place. In view of the inadequate number of reconnaissance units available, however, it was possible to keep under observation only a relatively small segment of the extensive enemy rail system.

Antiaircraft artillery operations also were rendered difficult by the wide extent of the zones of operations and of the rearward occupied enemy territories, and it was possible to provide concentrated antiaircraft defense for only a few target areas at any given

time. As a rule the pattern of antiaircraft artillery operations was as follows: The antiaircraft artillery units of the antiaircraft artillery corps under the air fleets, and the antiaircraft artillery units assigned under army commands were committed in defense of the routes of advance, near front targets--such as troop assemblies, artillery concentration areas, and bridges--and on a large scale in ground combat missions against bunkers, strongpoints, and attacking Soviet tanks. In addition, air fleet headquarters allocated antiaircraft artillery units to defend airfields, and the various air district commands committed such units to defend traffic centers, supply bases at which particularly important items of supply were stored, and important bridges on major supply routes.

The Air Signal Corps had exceptional difficulties to contend with in establishing signal communications covering the great distances involved in the eastern theater. Radio communications naturally played an all-important role in the eastern theater. Owing to the vulnerability of radio communications to intercept operations and to interferences of all types, however, it was not possible to rely alone on radio in the conduct of operations. Thus it was essential to be able to reach all higher level headquarters by teletype and telephone. The distances which had to be covered for such purposes is illustrated by the fact that the line connecting the command train of the Second Air Fleet with the VIII Air Corps alone was 780 miles long.

The development of an aircraft reporting network of sufficient density, that is, covering the whole vast area of the eastern theater, was impossible. All that could be done in this field was to commit aircraft reporting units in areas of main pressure. Close cooperation between these units and fighter groups proved highly profitable in combat action against Soviet air units penetrating the German lines.

Air signal-liaison detachments with the army forces in the front lines proved to be most valuable. The reports received from these detachments enabled the tactical air support commands to maintain a precise interpretation of the rapidly changing situation on the ground, thus furnishing them the data required for the effective use of their combat units.

The field which presented the greatest difficulties was that of supply operations, which had to function in the immense distances in

the eastern theater and on substandard roads, many of which could not be traveled at all during the mud seasons. This situation resulted in problems which in many cases could only be remedied by an increased use of transport aircraft, the continued development of which was promoted systematically for this reason. In August 1941 a large Type Gigant freight glider landed for the first time on an airfield in the zone of the Second Air Fleet, bringing 11 tons of bombs. These gliders were later powered by six engines.* Air transportation was naturally used not only for the movement of Luftwaffe supplies but also to meet the requirements of the Army, an activity which was of particular consequence, for example, for the supply of fuel and ammunition to armored units far ahead of the general advance on the ground.

Thus as the war continued, the Luftwaffe's position became increasingly difficult. Beginning in 1941 it had been compelled to forfeit any possibility of conducting strategic operations in order to be able to furnish adequate air support for the Army.

The Eastern Theater in 1942-44. German air operations in the eastern theater from 1942 on again clearly revealed that it was not possible to conduct counterair warfare simultaneously with air operations in support of the ground forces. The close interrelation between air operations and developments in the military situation on the ground became the salient feature in further developments. Generally speaking, the mission directive for each air fleet required operations in support of the army in cooperation with a specific army group.

With an overall average strength of 6,821 and an operable strength of 4,262 aircraft available to the Luftwaffe, the combined combat strength of all units committed in the eastern theater fluctuated between 2,000 and 3,000 aircraft. The operable strength of 4,264 aircraft in June 1942 comprised 486 reconnaissance, 1,237 bomber, 369 dive-bomber, and 278 twin-engine and 1,253 single-engine fighter aircraft, plus 529 transport planes and 112 seaplanes.[7]

The Soviet Air Force had recovered from the defeats it had suffered in 1941. It was now stronger and more up-to-date than before, and its officer and enlisted personnel had been trained in accordance with German standards. Even as early as 1942 the Soviets

* Editor's Note: The Me-323.

again had roughly 5,000 aircraft on line. Out of this number approximately 15 percent were type U-2 planes,* used as improvised bomber or courier units.

German air operations in 1942 were determined largely by the offensives on the ground directed at the Volga River and the Caucasus in the southern part of the eastern theater. The vast majority of all air missions executed were missions of army support in action directly in front of the German ground forces. Eighty percent of all bomber forces available were employed in missions of direct support for operations on the ground, with only a small number committed against targets in the far enemy rear, in action commensurate with the actual mission assignment. Sizable strategic air missions were executed only in the central and northern areas of the eastern theater, where the ground situation permitted such action./ These attacks struck industrial installations of military importance in the areas of Gorki, Rybinsk, Moscow, and Leningrad, the ports of Murmansk and Arkhangel'sk, and the railway system, which was of extreme importance to the enemy.

The Luftwaffe Command realized the harmful results of a system in which air operations were too strictly contingent upon army operations, and the characteristic feature of 1943 in command circles was the struggle for authorization to employ the bomber forces in strategic missions. The outcome of this struggle was the dispatch of large air forces against the Gorki tank factory and installations of the Jaroslavl rubber industry during the months of quiet between battles.

Under pressure of the ground situation as it developed with the opening of the Soviet summer offensive, however, all available units again had to be thrown into action in direct support of the Army. Here, the units were split up, their operations intermeshed with operations on the ground, and consequently could not be brought to bear against concentrations far in the enemy rear.

It is true that the IV Air Corps in 1944 received the mission

---

* Editor's Note: A single-engine training and ambulance biplane.

/ In actual fact only a few attacks were carried out.

of renewing strategic combat operations against traffic targets in the far enemy rear. Good results were achieved in this field as a result of the application of methods employed in the west in a form adapted to the requirements of the eastern theater. Generally speaking, however, air operations still remained tied to the operations of the ground forces for the purposes of direct support. In 1943 80 percent of all air activities were dictated by the mission of tactical support for the Army, and military events in 1944 produced no changes of any consequence in this situation.

A study prepared in 1944 by the Military History Division of the Luftwaffe General Staff[8] furnished a further development of the problem:

> The further course of the war in the air, after 1941, was characterized by the fact that the Luftwaffe was no longer as in the past employed in concentration on only one front against only one enemy within the overall pattern of the whole war. Through its employment in a number of theaters simultaneously, it was compelled to dispatch its forces against the enemy in widely separated areas. This necessarily resulted in a reduction of the operable strengths available in the individual segments of the fronts. This made the departure from the past principles of operational warfare in favor of direct support for the Army and the Navy an accomplished fact. The conditions for an employment of air power consonant with the principles of Douhet were thus removed.

The situation in the eastern theater created what must be considered as a classic example. Because of its inferior strength, the strategic Luftwaffe was forced out of its real role in spite of a clear realization of the adverse results which would follow. Neither in Russia, nor in the Mediterranean and western theaters did German air superiority continue. As a result the initiative passed more and more to the enemy. Our own air forces, however, found themselves implicated in air defense under the pressure of events of the war. Thus the thing had happened which Douhet had desired to avoid. For in his opinion the strategic offensive was always to be considered as the most effective form of operations. He desired its application even if the friendly air forces were weaker than those of the enemy.

The attempt to achieve lasting results by means of strategic

air operations was nevertheless repeated frequently. Attacks were directed occasionally at militarily important factories in Gorki, Jaroslavl, Rybinsk, Moscow, and Leningrad. However, no telling results were achieved because the forces dispatched were too small and because the attacks took place at too long intervals. Therefore, the objectives propounded by Douhet for such attacks could not be achieved.

The fact was that in view of the difficult situation on the ground, all available air forces were thrown in a steadily increasing measure into combat action in direct support of the Army. In such action their units were necessarily split up and were tied down to action contingent upon events on the ground, and in consequence could not be brought into action against such paying targets as troop concentrations in the enemy rear.

On the enemy side the flow of men and materiel to the battlefields continued almost without interference, where they created the necessary conditions for the commencement of enemy military successes. This again showed, by negative proof, how right Douhet's overall concept was of the all-important significance of airpower in modern warfare.

Chapter 6

SUMMARY

It was an inescapable necessity for the Luftwaffe to provide support for the Army within a certain scope. In ground-to-ground combat operations certain missions developed which could actually only be executed satisfactorily by air forces. In battles of decisive importance on the ground it was undoubtedly also sound practice to employ the bulk of available air forces to support the Army in missions of direct or indirect support appropriate to the nature of airpower. It was such use of airpower which had provided the pattern for victory in the blitz campaigns against Poland in 1939, France in 1940, and the Balkan countries in 1941.

Generally speaking, the same held true for the first few months of warfare in the eastern theater. In the periods of quiet which then followed between the great battles on the ground, however, the continued employment of airpower primarily in support of the Army cannot be considered as having been a sound policy. The operational and tactical doctrines established in Air Field Manual No. 16 quite rightly provided that, with the exception of times when very large army forces were locked in battles of decisive importance, action against the military resources of the enemy--concurrently with action to establish and maintain air supremacy--was the decisively important mission of airpower.

However, the German overall military command, and the Luftwaffe Command, almost completely neglected air combat operations of this type, particularly in the eastern theater. Precisely at the time when Russian superiorty in tanks and ground-attack aircraft was making itself increasingly felt, strategic targets existed against which attacks certainly would have produced results with a greater impact on ground operations than could ever be produced by continuous missions of direct army support, frequently carried out with inappropriate means.

Obviously, the Luftwaffe realized the disadvantages of the system it was following during the war. Thus a letter by the Luftwaffe

Operations Staff in November 1943 observed:*

> 1. In the Russian campaign German airpower was employed soundly until the German advance reached the Dnepr River line in the autumn of 1941. It was the destruction of the Russian air forces, plus the direct air support given to the /German/ ground forces, which made the rapid advance possible at all. From that moment on, at least elements of the Luftwaffe should have been committed in action
>
> a. Against Russian rail routes deep in the Russian interior, but particularly to prevent or to hamper the evacuation of large installations of the armament industry to the Russian rear.
>
> b. Against armament factories still operating within striking range.

After enumerating the reasons why the great weakness of the German ground forces made air operations of this type impossible, the letter concluded that "we have missed the time of most favorable opportunities, and that the difficulties have become very great."

In spite of these difficulties, the decision was taken at the end of 1943 to withdraw a number of bomber units from line and train them for strategic operations against the enemy resources of military power. Suitable targets in sufficient numbers existed, and, in cooperation with the Minister for Armament and Ammunition, a bombing program against Soviet industry and supply depots was worked out. The plan assumed that by careful selection of targets it would be possible to reduce the monthly Russian deliveries to the front by 3,500 tanks and 3,000 aircraft. With this purpose in view IV Air Corps headquarters, with three bomber and several twin-engine fighter wings, were withdrawn from action and given training for strategic long-range operations. But the time was past: what would have been entirely practicable in 1941 was no longer so. By the time the Corps

---

* The complete text is in Appendix 36 in unpublished appendices of USAF Historical Study No. 163. Karlsruhe Document Collection.

completed its training in the middle of 1944, the German lines had been pushed back so far as to place the major portion of the targets out of range. The lack of long-range bombers was acutely felt at that time. Furthermore, considering the unfavorable German military situation in 1944, the withdrawal of these wings from combat only served to accelerate the loss of ground on the eastern front. Here it became evident that the problem could hardly be solved by the Luftwaffe alone. Stringent measures by the Wehrmacht High Command would have been necessary to so increase the strength of the ground forces that the Army would not have been compelled to rely constantly on support from the Luftwaffe. It was esssential to restore freedom of action to the Luftwaffe, but exactly the opposite happened.

The weakness of the Army in the winter of 1941-42, given by the Luftwaffe High Command in its letter as the reason for the fact that no air forces could be made available for operational air warfare, was to be found in Hitler's refusal, in spite of the advice of experienced Army commanders, to withdraw the front in the east to a shorter and more easily defensible line. Even later, after cessation of the German offensive operations in the eastern theater from the autumn of 1943 on, measures to straighten out the front line would have been the most effective way to economize in forces.

Writing on this subject Captain Harry Butcher, General Eisenhower's aide, observed on 29 January 1944:[1]

> The length of the front line in Russia as measured on the map is slightly more than 1900 miles, an increase of 500 miles over the front line as it existed when the Russians started their big offensive in July, 1943. If the Germans retreat to the shortest line from the Baltic to the Black Sea, it is presumed German divisions may be released and the same strength of opposition continued against the Russians.

However, Hitler refused to sacrifice even a square yard of ground voluntarily in the eastern theater, and insisted on holding frontages far in excess of the capabilities of the German forces available. In the case of forced retreats he time and again ordered the troops to hold fortified points as islands of resistance surrounded by enemy occupied territory, allegedly in order to contain enemy forces and thereby slow down the general enemy advance. German strengths

were further depleted by the hundreds of thousands of troops lost in this way. What is completely incomprehensible here is that Hitler even refused to give any consideration to plans for German offensive operations involving an initial voluntary tactical withdrawal. In a conference at Feltre, Northern Italy, on 19 July 1943, for example, he stated to Mussolini:[2]

> His generals frequently recommended the sacrifice of one area or another in order to improve opportunities for operations. This was completely false; one must not cede the enemy an inch of captured terrain and must conduct the war as far as possible from the homeland.

It was such a policy which rendered it completely impossible to operate against the Soviet forces from the summer of 1943 on, since the over-extended frontages in the eastern theater alone made it impossible to make forces available for offensive operations.

A study of German operations in World War I against the Russian forces, which at that time were heavily superior in numbers, shows that the German Command achieved a number of decisively important victories over the Russians in operations staged from withdrawal movements. In contrast, by prohibiting withdrawals in combination with attacks from the withdrawal movement, Hitler robbed the German field commands of the possibility decisively to weaken the Russian forces while at the same time he exposed his own forces, numerically far weaker than the Russians, to certain annihilation.

The German command organization was another factor partly responsible for the fact that German airpower was no longer employed in a logically proper manner, thus preventing the achievement of decisive results through a real power concentration. The Luftwaffe command was so organized at the highest levels that, under the Commander in Chief of the Luftwaffe, the air fleet headquarters each controlled simultaneously and through lower level commands their strategic forces, their tactical forces, their air defense forces, and their own ground service organization.* In times of war each air fleet was assigned to support one army group. This organization had

---

* See Appendix 25.

proved sound while Germany was fighting a war on one front only, as long as the air fleets were operating from bases in Germany, and as long as the Luftwaffe remained completely superior in the air. After the conflict had developed into a multi-front war, with the air fleets committed far inside enemy territory, and when the original German superiority in the air had deteriorated into a pronounced inferiority, the organizational setup was no longer sound.

It need be mentioned only incidentally that the problem of a practicable air defense system also called for a different solution. The matter of a practicable command organization for the tactical air forces has been discussed previously in this study. The intention at this point is to deal only with the problem of a practicable command organization for the heavy air units of the Luftwaffe.

During the 1939 campaign in Poland and that of 1940 in western Europe, the bomber forces had been concentrated under only two air fleet headquarters; now they were distributed among six air fleets. Such an arrangement made a proper concentration of power unthinkable. As previously mentioned, the fact that these air fleets were each harnessed to one army group produced the unavoidable result that the bomber units were often committed in continuous missions of army support, and were frequently employed unwisely even in action over the field of battle. By thus distributing and splitting up its bomber forces the Wehrmacht High Command, as the highest level of German military command, had deprived itself of an immensely powerful means of combat. In comparison, it is interesting to note the manner in which the German Army High Command in World War I had kept its bomber forces firmly consolidated for employment consonant with their capabilities against sizable targets in the enemy rear areas.

After 1941 it would have been wise to withdraw the bomber wings from control by the individual air fleet headquarters and place them under suitable command staffs under a centralized bomber command. This was the only possible way to secure their commitment in concentration at decisively important points when necessary in support of the Army. Only if this had been done would the Luftwaffe have been in a position to exercise a decisive influence on military events.

It should be noted, however, that what has been said in this

study has not been said with any intention to gloss over the fact that, owing to the circumstances of the multi-front war and to the air armament effort of the Western Allies, the Luftwaffe, in any case, was no longer in a position to perform its missions because of strength and supply considerations.

NOTES

Chapter 1

1. Material for this chapter has been taken largely from Handbuch der neuzeitlichen Wehrwissenschaften (Manual of Modern Military Science), 1939. Karlsruhe Document Collection, G X 1.

Chapter 2

1. "Selection of Tactical Reconnaissance Aircraft," from a lecture by Captain Pohle, General Staff, during a General Staff Tactical Tour in June 1939. Karlsruhe Document Collection, C IV 2a.

2. Ernst Heinkel, Stuermisches Leben (Stormy Life) (Stuttgart, 1953), pp. 331-333. English edition ed. by Jurgen Thorwald (New York, 1956).

3. Hans-Ulrich Rudel, Trotzdem (In Spite of Everything) (Waiblingen/Wittenberg, 1950 /?/), p. 82.

4. Ltr, Generalluftzeugmeister (Chief of Special Supplies and Procurement Services), Document No. 3800/41. Karlsruhe Document Collection, F V 1aa.

5. Generalluftzeugmeisterbesprechung (Chief of Special Supplies and Procurement Services Conference). Karlsruhe Document Collection, F V 1aa.

6. "Die deutsche Luftwaffe an der Ostfront" (The German Air Force on the Eastern Front), vol. 4, 122. Karlsruhe Document Collection.

7. Report, Generalluftzeugmeister (Chief of Special Supplies and Procurement Services), Document No. 18/42, 8 January 1942. Karlsruhe Document Collection, C VI 2.

8. Ltr, Generalluftzeugmeister (Chief of Special Supplies and Procurement Services) to Commander in Chief, Luftwaffe, 29 Oct. 1941. Karlsruhe Document Collection, F V 1aa.

9. From the War Journal of the High Command, Luftwaffe, 1945. Karlsruhe Document Collection, C VI 2. The Mistel plane was a twin-engine bomber loaded with explosives. A fighter plane clipped to its wing steered it into the target, releasing it shortly before the target.

10. Karlsruhe Document Collection, F III 1.

Chapter 3

1. This chapter is taken largely from General der Flieger (Lieutenant General) a. D. Karl Drum, "Der Einsatz der dem Heer Taktisch Unterstellten Verbände der Luftwaffe" (Operations of the Luftwaffe Army Support Units). Karlsruhe Document Collection, F III 1a.

2. Dr. Elze, "Der Koluft 14 im Polnischen Feldzug, 1939" (The 14th Air Support Command in the Polish Campaign, 1939). Karlsruhe Document Collection.

3. "Luftwaffeneinsatz in Africa" (Luftwaffe Operations in Africa), an extract from "Der Feldzug in Nordafrica" (The Campaign in North Africa). Karlsruhe Document Collection, G VII 10.

4. As quoted in the manuscript by Generalleutnant (Major General) Hermann Plocher, "The German Air Force Versus Russia on the Eastern Front," vol. II, to be published in the German Historical Monograph series.

5. Dr. Theodor Stocke, "Die kartographische Vorbereitung des Dnepr Uebergangs 1941 beim LII Korps" (The Cartographic Preparation for the Crossing of the Dnieper in 1941 by the LII Corps), Wehrwissenschaftliche Rundschau, vol. VI (1956), 202-203.

6. Report to General der Flieger (Lieutenant General) Karl Drum by Colonel Nagel, wartime squadron leader, 4th (Tactical) Squadron, 31st Air Reconnaissance Group.

7. "Richtlinien fur das Gewinnen von Luftaufklaerungsmeldungen durch die Verbaende des Ob. d. L. und des Ob. d. H., ihren Austausch, und ihre Verwertung fur die Zwecke der Luftwaffe und des Heeres" (Directives for the Processing of Air Reconnaissance Reports Through the Units of the Luftwaffe High Command and the Army High Command, Their Exchange and Their Utilization for the Objectives of the Luftwaffe and the Army). Luftwaffe High Command, Operations Staff Ia/II, 20 April 1941. Karlsruhe Document Collection.

8. "Zusammenarbeit mit dem Heer, 1944," (Coordinated Action with the Army, 1944), Luftwaffe High Command, Operations Staff (Ia), Document No. 4100/44, 24 July 1944. Karlsruhe Document Collection, F III 1a.

Chapter 4

1. Colonel Hans Jeschonnek, Chief of the Luftwaffe General Staff, "General Observations on Tactical Operations," from a General Staff Tour Critique, June 1939. Karlsruhe Document Collection, F III 1. Editor's note: In February 1939 Colonel Jeschonnek had become Chief of the Luftwaffe General Staff, succeeding General Hans Stumpff in that post. Jeschonnek took his own life on 19 August 1943.

2. Colonel Ernst Kusserow, "Unterstuetzung des Heeres durch die Luftwaffe im Feldzug gegen Russland" (Luftwaffe Support of the Army in the Campaign Against Russia) (hereinafter cited as "Unterstuetzung . . . ."), 2 Sept. 1954. Karlsruhe Document Collection, F III 1.

3. John R. Deane, The Strange Alliance (New York, 1947), p. 93.

4. "Der Einsatz der deutschen Luftwaffe waehrend der ersten 11 Tage der Frankreichfeldzuges" (Operations of the Luftwaffe During the First Eleven Days of the Campaign in France), taken from the daily situation reports of the Air Operations Section (Ic), Luftwaffe High Command. Karlsruhe Document Collection, G V 2c.

5. Ibid.

6. Ibid.

7. Cf. General der Flieger (Lieutenant General) Paul Deichmann, "Balkan-Feldzug des VIII Fliegerkorps" (The VIII Air Corps in the Balkan Campaign). Karlsruhe Document Collection, G VII 6.

8. Karlsruhe Document Collection, G VII 6.

9. An unpublished German Monograph study, in Karlsruhe Document Collection. See also, Generalmajor (Brigadier General) Hitschhold, "Die Entwicklung der Schlacht-und Sturzkampfliegerei waehrend des Kampfes in Russland" (Development of Attack and Dive Bombing Aviation During the Battles in Russia), Karlsruhe Document Collection; "Der Luftkrieg im Osten 1941" (The Air War in the East, 1941), Karlsruhe Document Collection.

10. "Abschnuerung des Schlachtfeldes waehrend der Schlacht um Kiew" (Isolation of the Battlefield During the Battle of Kiev), taken from situation reports, Operations Staff, Luftwaffe High Command. Karlsruhe Document Collection, G VI 3b.

11. "Der Luftkrieg im Osten gegen Russland 1941," (Air Warfare Against Russia in the Eastern Theater in 1941), Report, Military History Division (8th), Luftwaffe General Staff. Karlsruhe Document Collection, G VI 3a.

12. Generalleutnant (Major General) Hermann Plocher, "Unterstuetzung des Heeres durch die deutsche Luftwaffe im Osten 1941/42" (Support of the Army by the German Air Force in the East, 1941-1942) (hereinafter cited as "Unterstuetzung des Heeres . . . ."). Karlsruhe Document Collection, G VI 3a.

13. "Das II Fliegerkorps im Einsatz gegen Russland vom 22. 6. 41 - 15. 11. 41" (The II Air Corps in Operations Against Russia from 22 June to 15 November 1941). Karlsruhe Document Collection, G VI 3b.

14. Zantke, "Eisenbahnjagdeinsatz schwerer Kampfverbaende im Operationsprogramm der deutschen Luftkriegsfuehrung, 1941" (Heavy Bomber Formation Attacks on Railroads in the Operational Program of German Air Warfare, 1941). Karlsruhe Document Collection, G VI 3d.

15. Deane, The Strange Alliance, pp. 94-95.

16. Plocher, "Unterstuetzung des Heeres . . . ." Karlsruhe Document Collection, G VI 3a.

17. More details on these operations are contained in the sources available in the Karlsruhe Document Collection, among them a report by the Luftwaffe Operations Staff, Intelligence Section/East (D), entitled "Grossangriffe des IV Fliegerkorps auf S. U. Eisenbahn System in der Zeit von 27. 3 bis 5. 5. 1944" (Major Offensive of IV Air Corps Against the Soviet Railroad System from 27 March to 5 May 1944). Karlsruhe Document Collection, G VI 6b.

18. The details given here are taken from situation reports of the Luftwaffe Intelligence Division and from Plocher, "Unterstuetzung des Heeres . . . ." Karlsruhe Document Collection, G VI 3a.

19. Dwight D. Eisenhower, Crusade in Europe (New York, 1948), p. 122.

20. Details given here taken from Lieutenant General von Hoeppner, Aus Deutschlands Krieg in der Luft (The German War in the Air) (Leipzig, 1921). General Hoeppner was General Commanding German Air Forces.

21. Personal experience of the author during an assignment in the Operations Branch of the Luftwaffe High Command, 1935-37.

22. Plocher, "Die Unterstuetzung des Heeres . . . ." Karlsruhe Document Collection, G VI 3a.

23. "Die Unterstuetzung des Heeres im Osten 1941 durch die deutsche Luftwaffe," (Luftwaffe Support of the Army in the East, 1941), Historical Division (8th), Luftwaffe General Staff. Karlsruhe Document Collection, G VI 3d.

24. Plocher, "Unterstuetzung des Heeres . . . ." Karlsruhe Document Collection, G VI 3a.

25. Kusserow, "Unterstuetzung . . . ." Karlsruhe Document Collection, F III 1.

26. Field Marshal Albert Kesselring, Kesselring, A Soldier's Record. Tr. by L. Hudson (New York, 1954), pp. 96-97.

27. General Heinz Guderian, Panzer Leader (New York, 1952), Appendix VI (XIX Army Corps Order No. 3, 13 May 1940), p. 478.

28. Personal experience of the author, who was present as CG, 1st Air Division.

29. "Gefechtsbericht der 9 Armee und der 2 Panzerarmee uber die Schlacht im Orelbogen, 5 July-18 August 1943" (Combat Report of Ninth Army and Second Panzer Army on the Battle of the Orel Bend, 5 July-18 August 1943), Ninth Army High Command. Karlsruhe Document Collection, G VI 5a.

30. G. W. Feuchter, "Entwicklung und Kriegsentscheidende Bedeutung der Luftkriegfuehrung im 2 Weltkrieg" (Development and Decisive Significance in War of the Air Warfare Leadership in World War II), Flugabwehr und Technik, vol. II (Feb. 1949), 30.

31. Report by General der Flieger (Lieutenant General) Hans Seidemann, "Das VIII Fliegerkorps im Osteinsatz, 1943" (The VIII Air Corps in Operations in the East, 1943), 1943. Karlsruhe Document Collection, G VI 5a. Editor's note: General Seidemann was commanding general of VIII Air Corps at the time, with the rank of Generalmajor (Brigadier General).

32. "Panzer-Bekämpfung im Osten, 1943/1944" (Combat Against Tanks in the East, 1943/1944). Karlsruhe Document Collection, G VI 5a.

33. Eike Middeldorf, Taktik im Russland Feldzug (Tactics in the Russian Campaign) (Frankfort/Main, Mittler und Sohn, /?/).

34. Kusserow, "Unterstuetzung . . . ." Karlsruhe Document Collection, F III 1.

35. Horst von Riesen, "Die Luftwaffe -- der hervorragende Faktor eines Krieges" (The Air Force -- The Dominant Factor of War), Flugwelt, vol. II (1955).

Chapter 5

1. Information for this chapter is taken largely from studies prepared during World War II by the Military History Division (8th) of the Luftwaffe General Staff.

2. "Air Power in the West" (1940), article in Russian newpaper Krasnaya Swesia (Zvezda?), 14 August 1940. Source No. 206, Division VIa (Foreign Press), Luftwaffe General Staff.

3. "Umfang und Auswirkung der Unterstuetzung des Heeres durch die deutsche Luftwaffe auf den Ablauf der verschiedensten Feldzuege" (Size and Effect of Ground Support by the Luftwaffe in the Launching of the Various Campaigns), from a study of the 8th Division of the Luftwaffe General Staff. Karlsruhe Document Collection, F III 1.

4. Ibid.

5. Ibid.

6. "Die wichtigsten allgemeinen Einsatzerfahrungen des Jahres 1941" (The Most Important Operational Experience of 1941), prepared by the Military History Division (8th), Luftwaffe General Staff. Karlsruhe Document Collection, G VI 3a.

7. Compiled by the Supply Division (6th), Luftwaffe General Staff, from operable strength reports submitted by units.

8. "Einsatz zur Unterstuetzung des Heeres an der Ostfront" (Operations in Support of the Army in the Eastern Theater). Karlsruhe Document Collection.

Chapter 6

1. Captain Harry C. Butcher, My Three Years With Eisenhower (New York, 1946), p. 483.

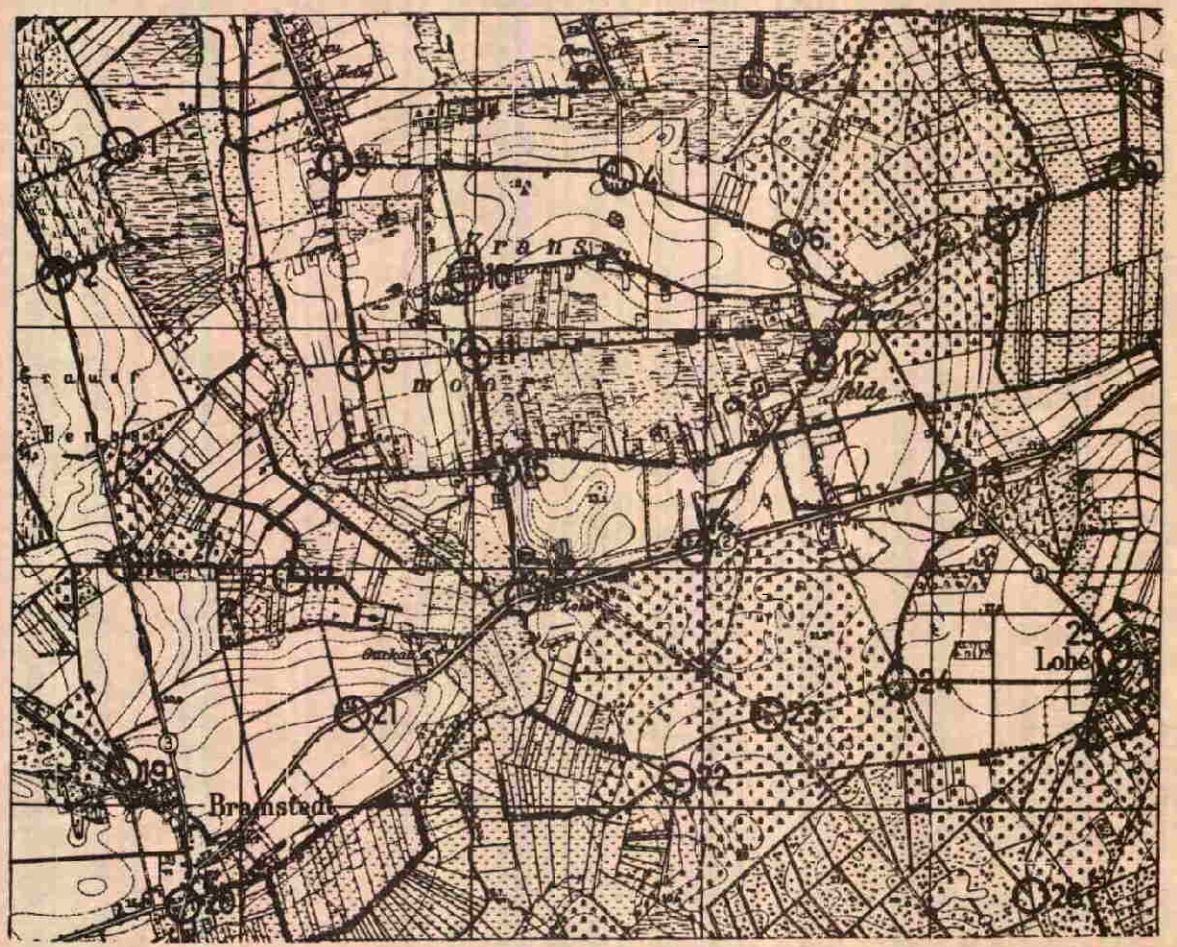
2. Enno von Rintelen, Mussolini als Bundesgenosse (Mussolini As Ally) (Stuttgart, 1951).

APPENDICES

Anlage 1

(POINT MAP)

ZIELPUNKTKARTE



Meldeverfahren bei Karten ohne Gitternetz

(Message Procedure with Maps without Military Grid)

Maßstab = 1 : 25 000

0 250 500 750 1000m = 1 km

(Das in obiger Karte vorhandene Gitternetz ist fortzudenken)

Anlage 2

Die Luftverteidigungskraefte an der Ostfront am 26. 3. 44
(The Air Defense Strength on the Eastern Front, 26 March 1944)

(Stand der Einsatzbereitschaft: 25. 3. 44)
(Combat-Ready Status: 25 March 1944)

(Unit) Verband:	(Airfield) Flugplatz	(Combat Ready Aircraft) Einsatzbereite Flugzeuge
II. /J. G. 52	Gramatikowo (Krim)	38
Rum. 49. J. St.	Saki (Krim)	5
15. /(kroat.)52	Karankut	0
Rum. IX. J. Gr.	Odessa	15
I. /J. G. 52 (ohne 1. u. 2. Staffel)	Kantakusenka	10
1. /J. G. 52	Jassy	10
III. /J. G. 52 (ohne 7.)	Kolomea	16
7. J. G. 52	Lemberg	6
Ung. J. St.	Lemberg	4
Stabs-Staffel/J. G. 51	Terespol	13
1/2 J. G. III. /51	Lublin (in Umruestung)	-
1/2 J. G. III. /51	Baranowitschi	10
St. J. G. 51	Bobruisk	4
I. /J. G. 51	Bobruisk	44
IV. /J. G. 51	Orscha	30
II. /J. G. 54 (ohne 4.)	Petseri	12
12. /J. G. 54	Petseri	8
Stab J. G. 54	Dorpat	3
IV. /J. G. 54 (ohne 12)	Dorpat	15
4. J. G. 54	Dorpat	6
I. /J. G. 54 (ohne Einsatz-Kdo.)	Wesenberg	18
Einsatz-Kdo. I. /J. G. 54	Lattsberg	8
Finnland, Norwegen (Stand: 10. 4. 1944)		
Stab J. G. 5		2
II. /J. G. 5		24
III. /J. G. 5		25
		326

Anlage 4

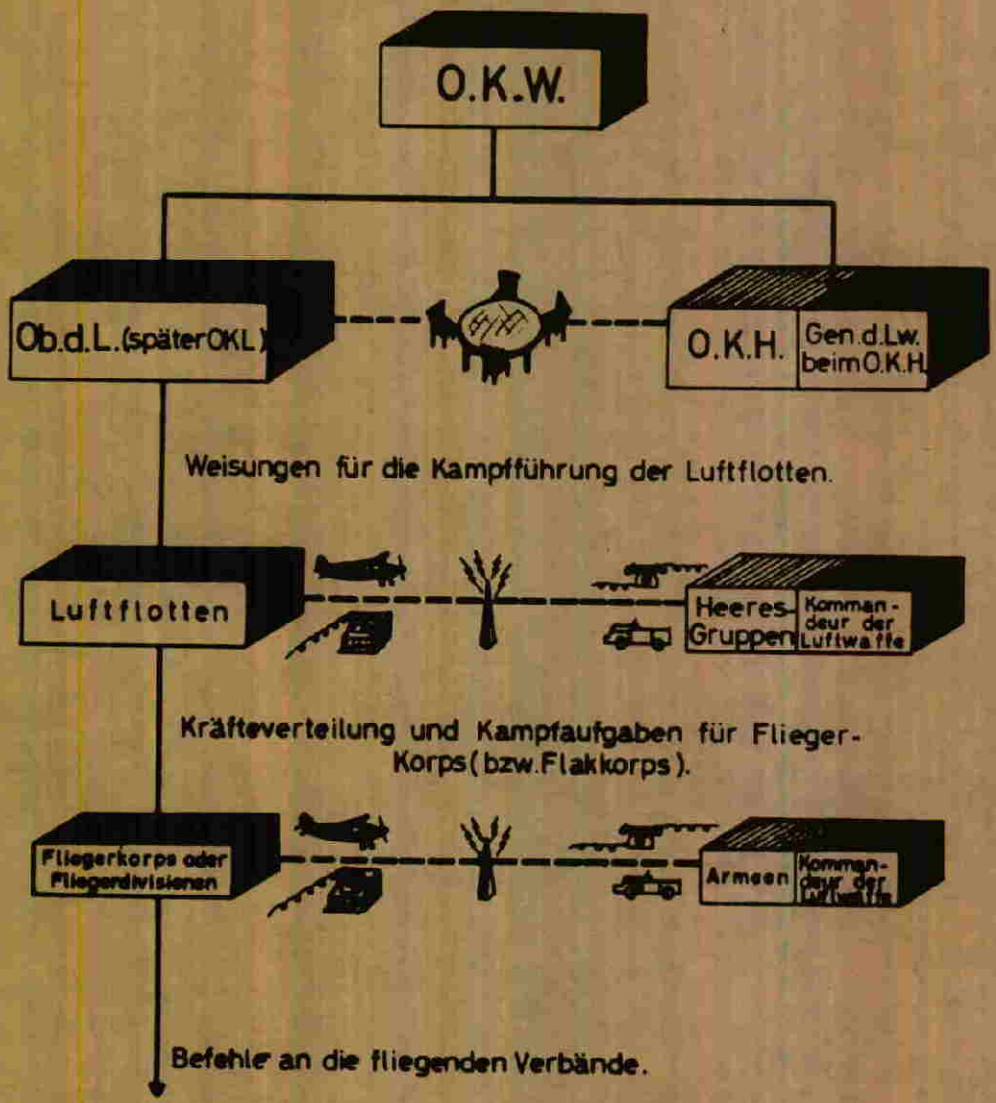
RUSSIAN TANK FACTORY AT GORKI

THIS PAGE DECLASSIFIED IAW EO12958

Anlage 5

Anlage 6

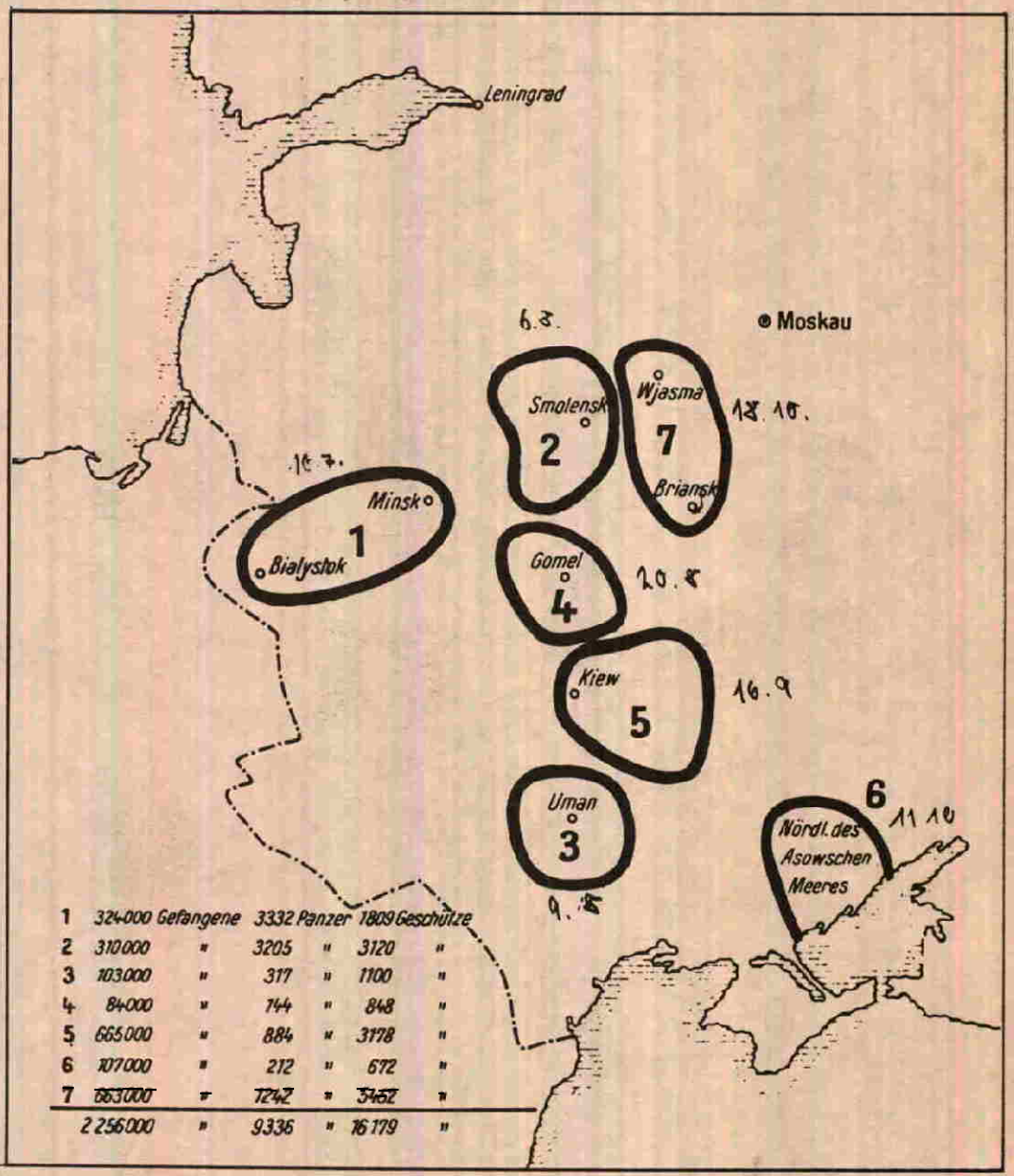
(Command Organization and Chain of Command for Operations of
~~Befehlsgliederung u. Befehlsgang fuer den Einsatz der fliegerverbaende~~
Flying Units in Support of the Army by Interdiction
zur Unterstuetzung des Heeres durch
of the Battlefield)
~~Abriegelung des Schlachtfeldes~~



Anlage 7

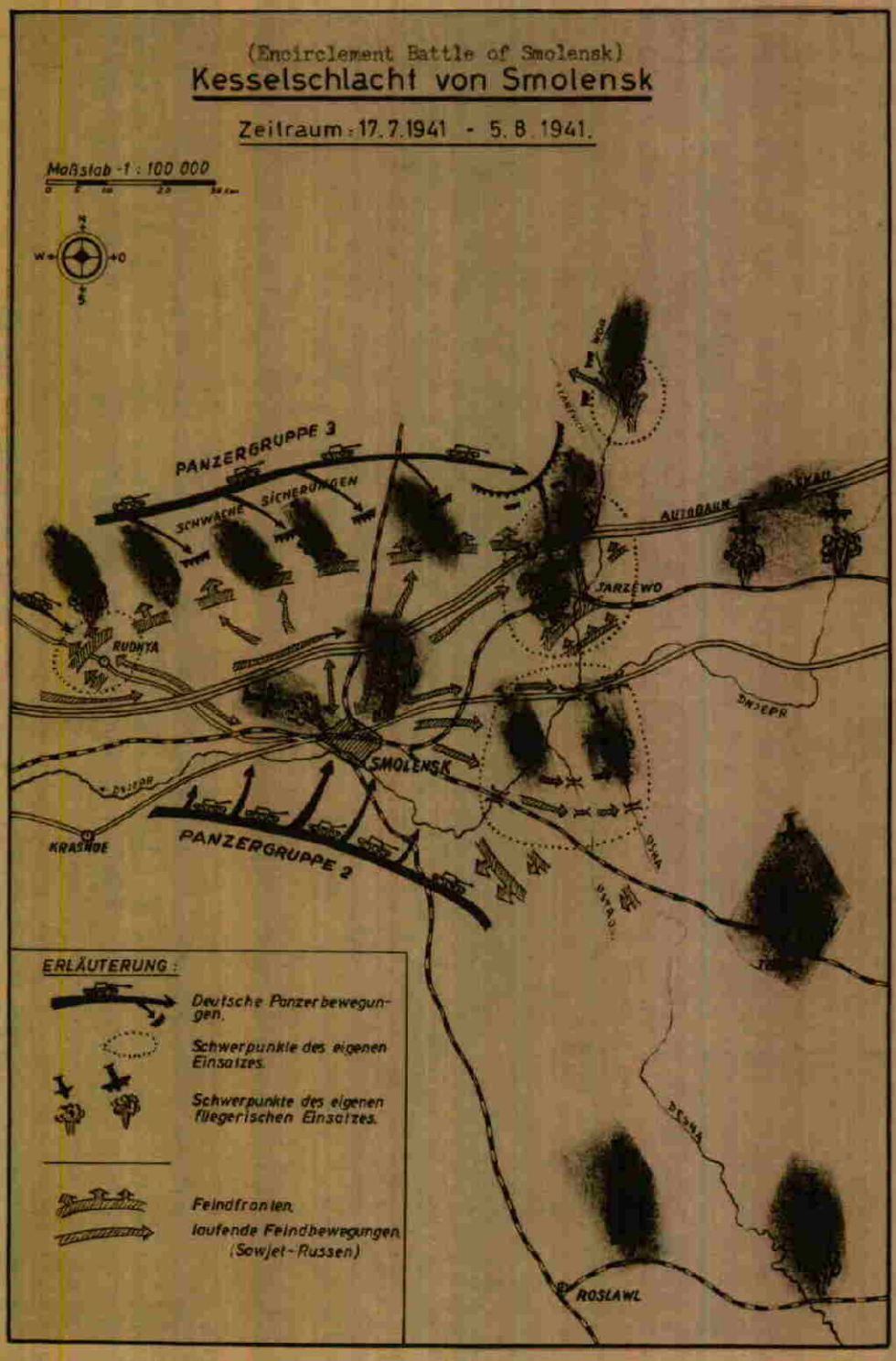
(The Seven Great Battles of Encirclement of the Eastern Campaign, 1941)

Die 7 großen Kesselschlachten des Ostfeldzuges 1941

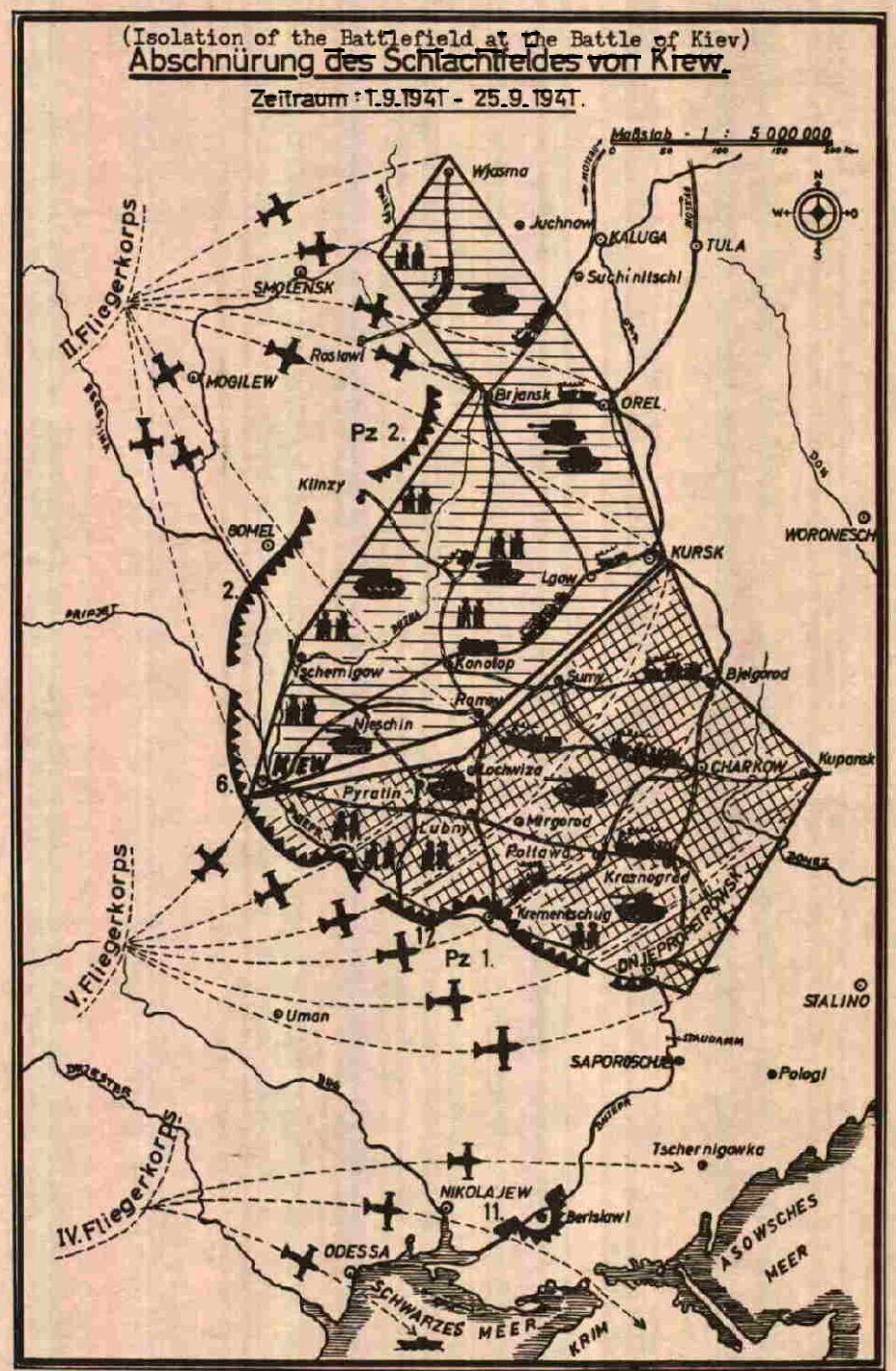


1	324000	Gefangene	3332	Panzer	1809	Geschütze
2	310000	"	3205	"	3120	"
3	103000	"	317	"	1100	"
4	84000	"	144	"	848	"
5	665000	"	884	"	3178	"
6	107000	"	212	"	672	"
7	~~663000~~	"	~~1242~~	"	~~3452~~	"
	2256000	"	9336	"	16179	"

Anlage 8



Anlage 9



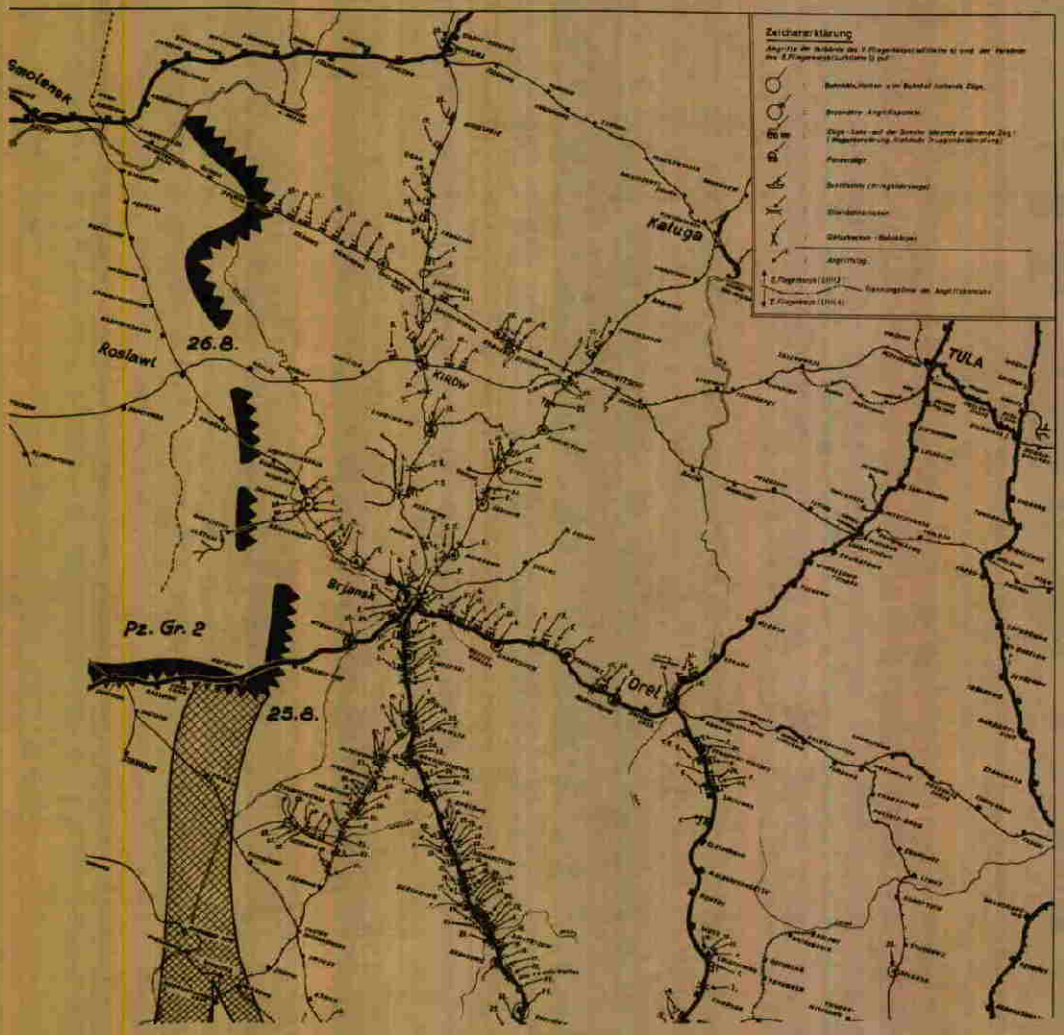
Anlage 10

(Campaign Against the Railroads During the Encirclement Battle of Kiev)

Eisenbahnbekämpfung

während der Abschnürung des Schlachtfeldes von Kiew.

Zeitraum : 1.Sept.1941 - 25.Sept.1941

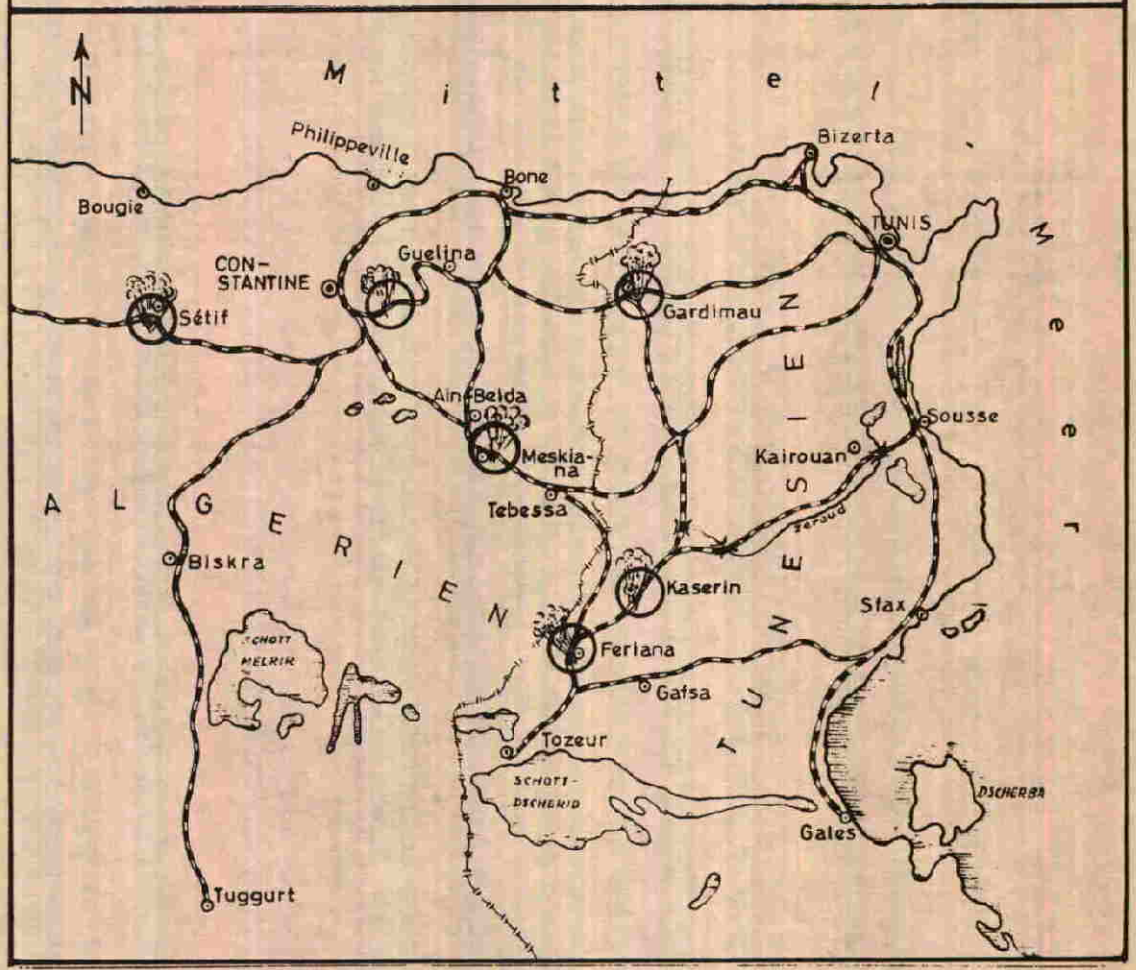


Anlage 11

Übersichtsskizze

über den Einsatz deutscher Sprengkommandos im Feldzug in Tunis

Ende Januar und Ende Februar 1943



(Survey Sketch of Operations of German Demolition Teams in the Tunisian Campaign)

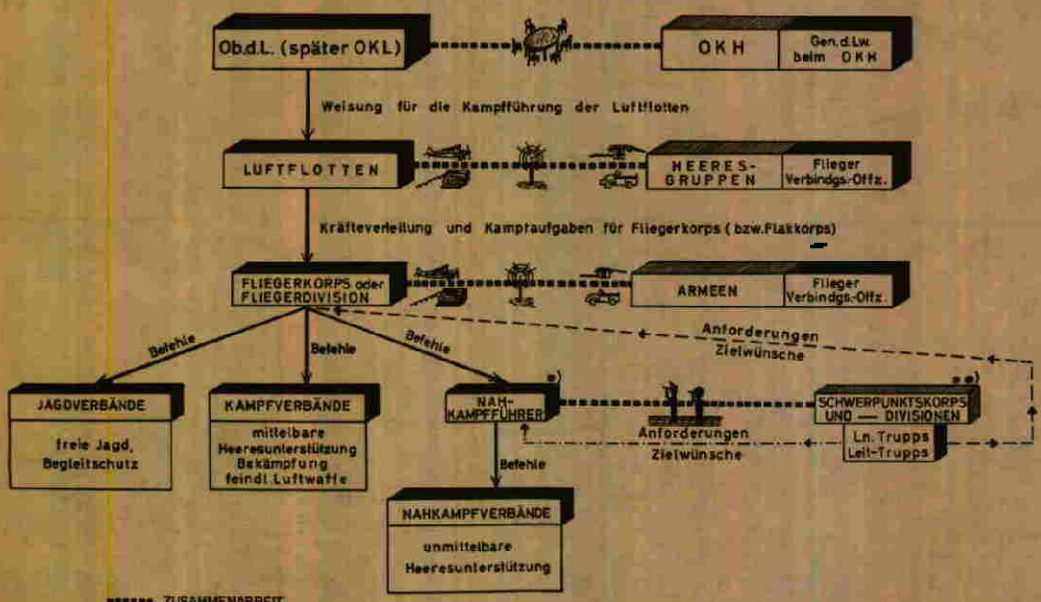
Maßstab - 1 : 4 000 000

0 20 40 100 Km

Anlage 12

1941/42 Command Organization and Chain of Command for Operations of the Luftwaffe on the Battlefield

1941/42 Befehlsgliederung und Befehlsgang für den Einsatz der LUFTWAFFE auf dem Schlachtfeld des HEERES



▪▪▪▪▪▪ ZUSAMMENARBEIT

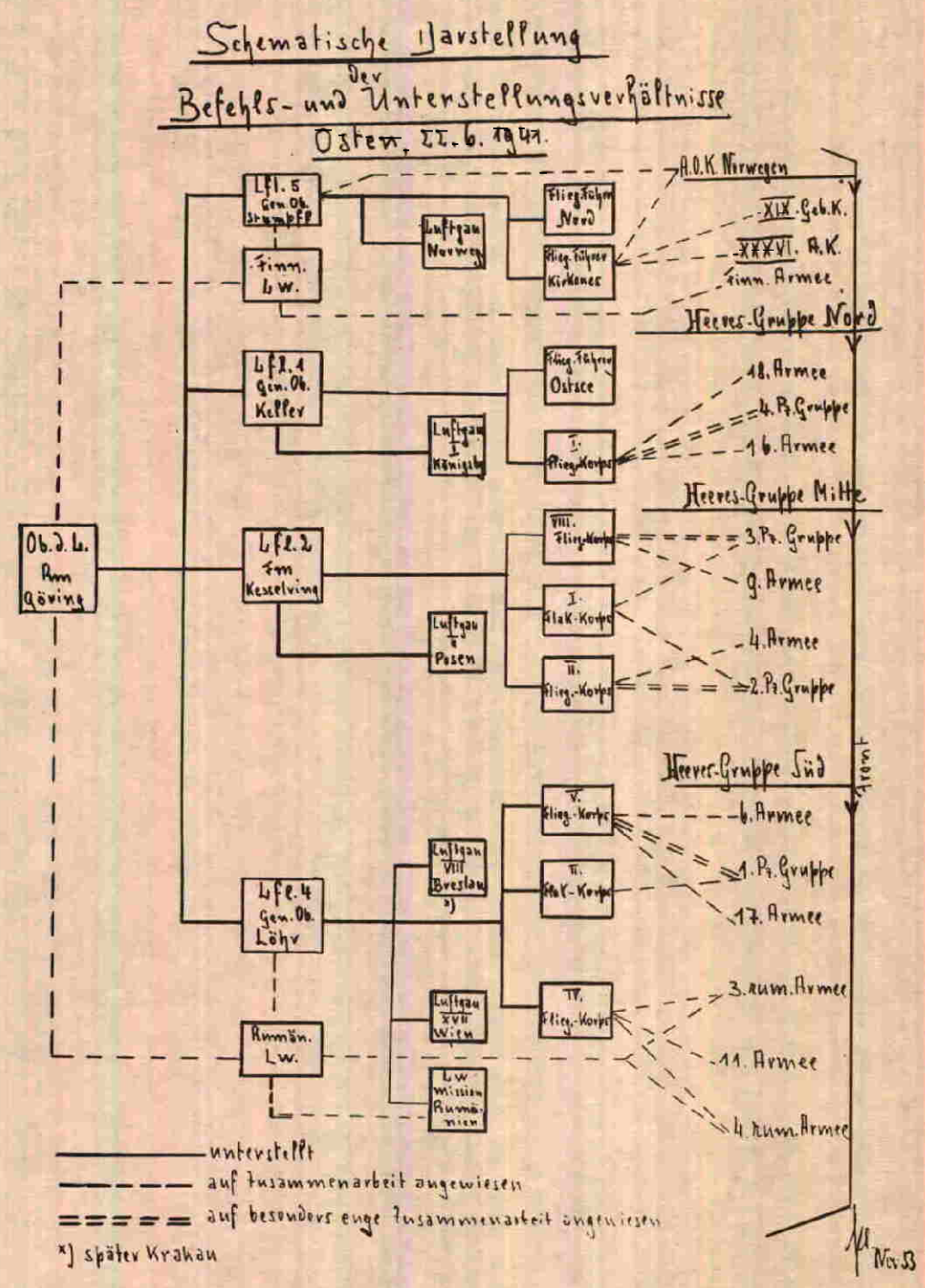
Bemerkung :

*) Ist kein Nahkampfführer vorhanden, gibt das FLIEGERKORPS die Einsatzbefehle unmittelbar an die NAHKAMPF-VERBÄNDE.

**) HEERESVERBÄNDE, die zur Zeit nicht von der LUFTWAFFE unterstützt werden, geben Wünsche zur Unterstützung durch die LUFTWAFFE an ihre vorgesetzten HEERESFÜHRUNGSSTÄBE.

Anlage 13

(Schematic Presentation of Command and Subordinate Unit Relationship, East, 22 June 1941)



Anlage 14

Schematic Presentation of Luftwaffe Ground Support

Schematische Darstellung der Lw-Unterstützung

Angriff: D -Tag, X - Uhr

X - 25 bis X - 20 Massierter Hochangriff gegen Gesamtziel-Bombenteppich

X - 20 bis X Sturzangriffe gegen Punktziele im Angriffsraum gemäß Feuerplan

X Angriff der Erdtruppe

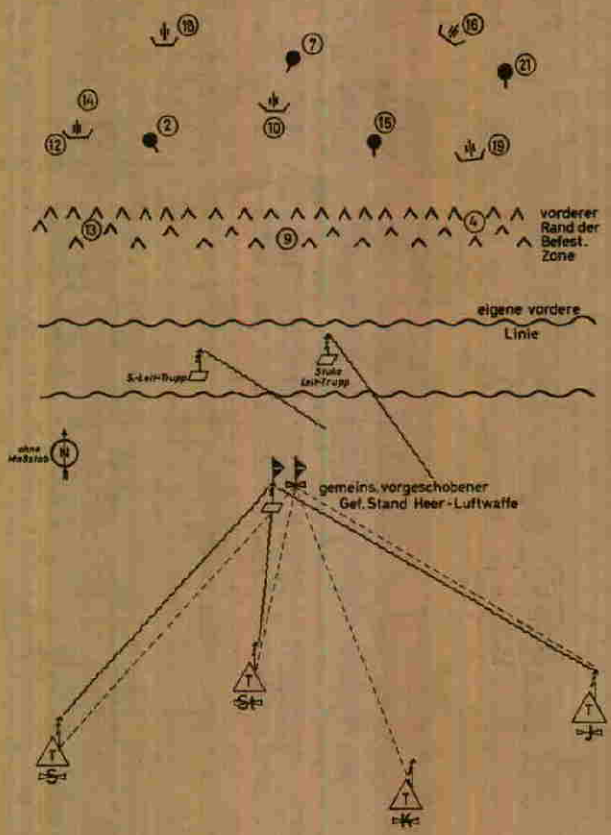
ab X Bekämpfung von Zielen in der Tiefe der Befestigungszone

Niederhalten der Feindflanken

Beweglicher Einsatz vom vorgeschobenen Gefechtsstand aus, je nach Erdlage

Zeichenerklärung:

- Artillerie-Stellung
- Panzerbatterie
- Schlachtflieger-, Stuka-, Luftnachrichten- } Leit-Trupp
- Flugplatz
- Draht- } Verbindung
- Funk- }
- 13 2 Ziel-Bezugs-Punkte für Kampf- bzw. Feuerplan Heer-Luftwaffe
- Kampfflieger - Bomber
- Jagdflieger - Fighter
- Schlachtflieger - Attack
- Stukaflieger - Dive-Bomber

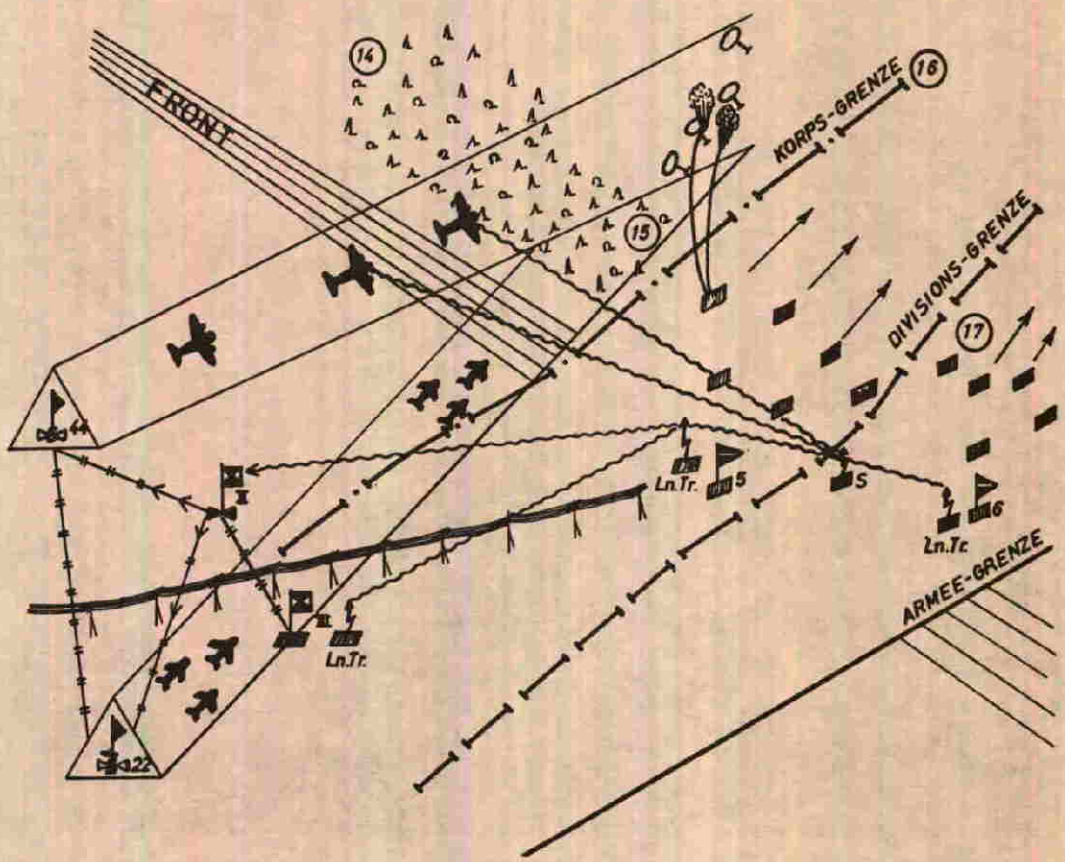


Anlage 15

Illustration of a Direct Support Action

Beispiel einer unmittelbaren Heeresunterstützung

(Anforderungs-und Befehlswege)



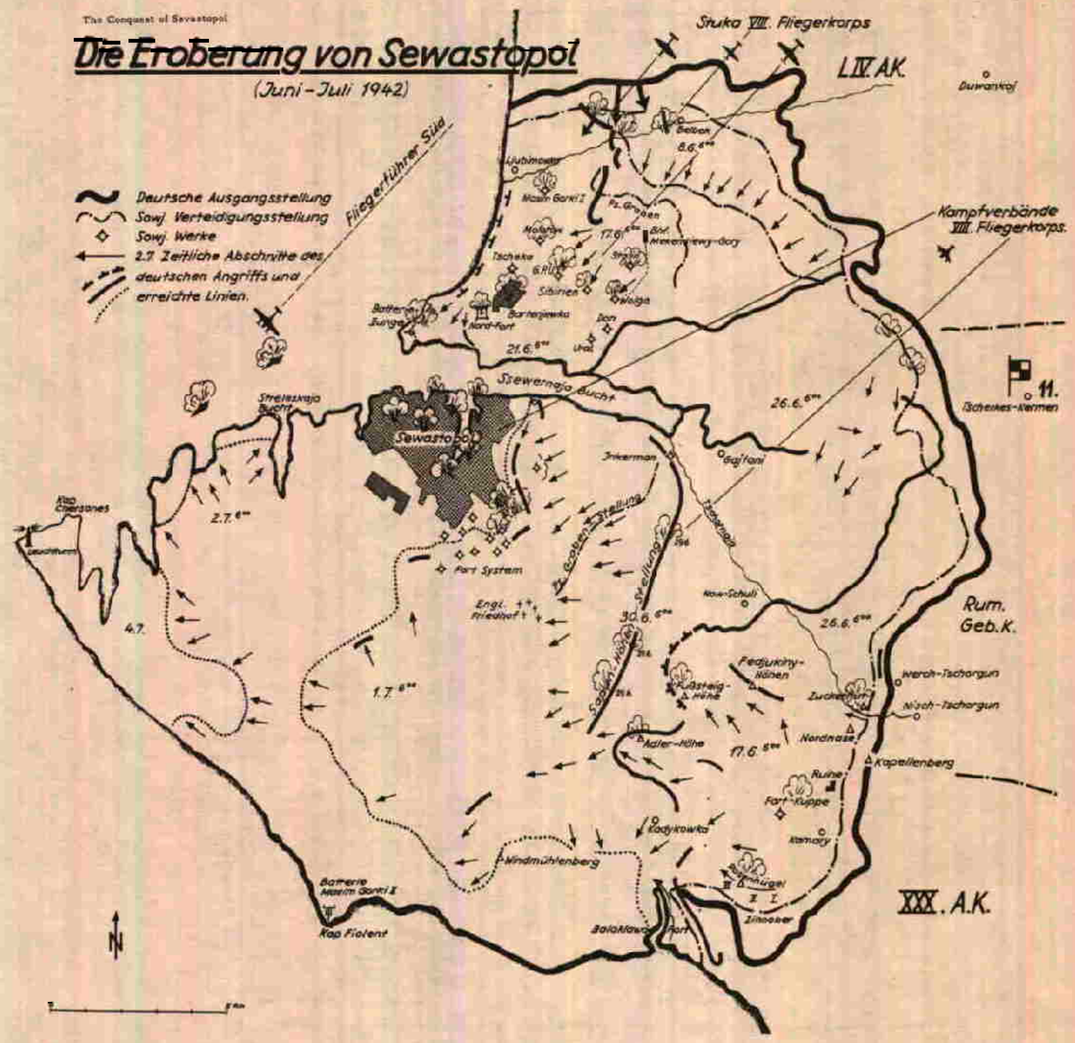
Zeichenerklärung:

- 14 17 — Bezugspunkte
- Flugplatz
- Ln. Trupps
- S — Schlachtflieger-Leit-Trupp
- Schwere Pak (Feind)
- Pz-Einheiten
- Funkverbindung
- Feldkabel (Doppel) Leitung
- Stammleitung

Anlage 16

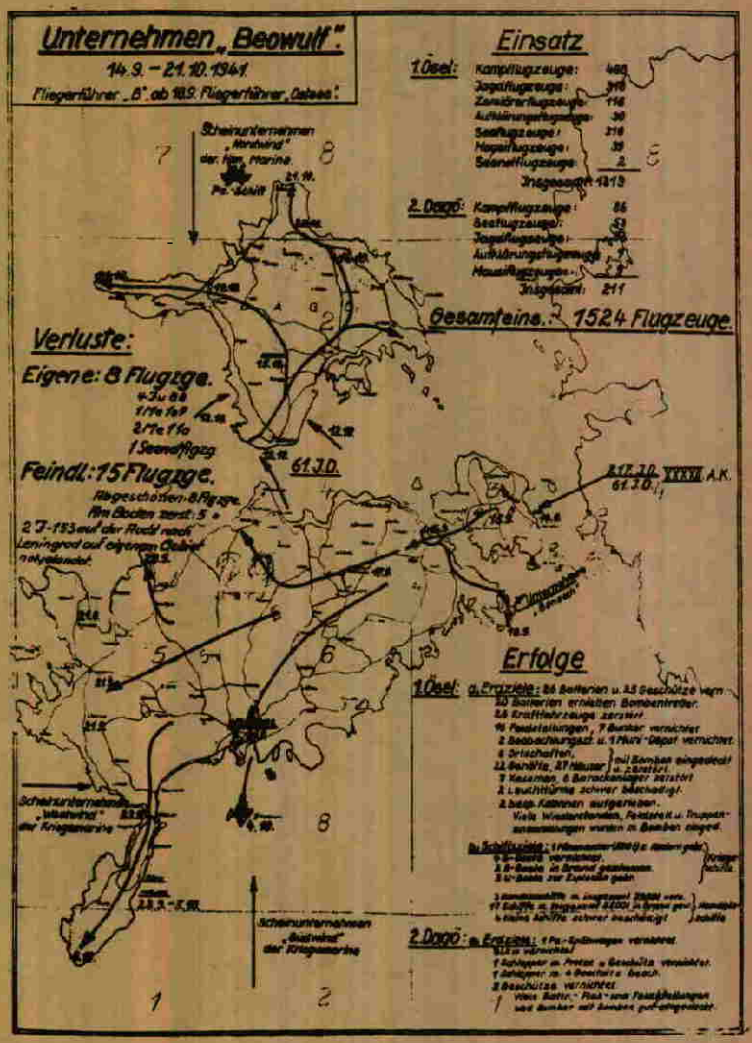
Anlage 17

The Conquest of Sevastopol



Anlage 18

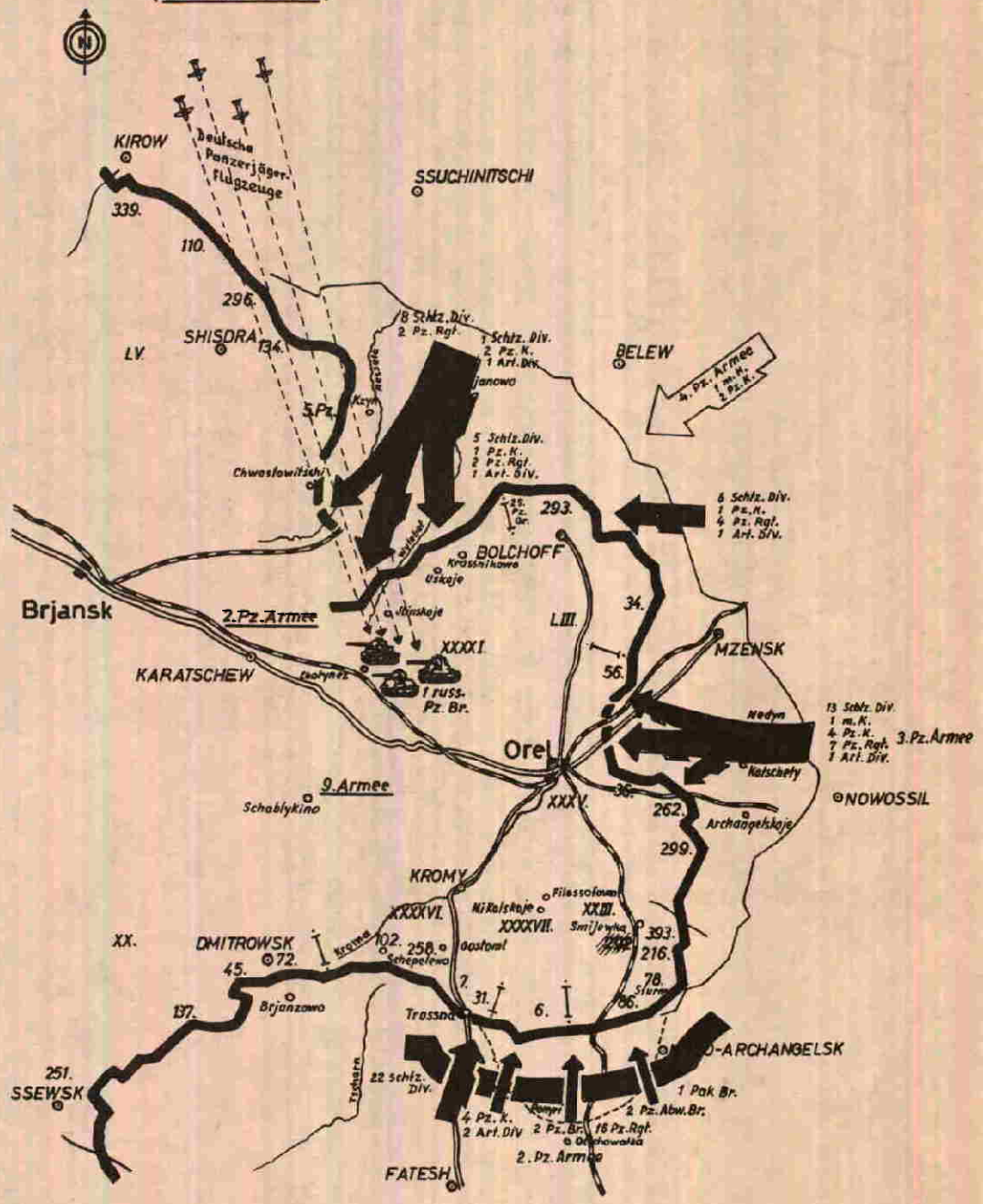
(Operation Beowulf)



Anlage 19

(Luftwaffe Prevents Union of Two Armies, Battle of Orel Bend)

Luftwaffe verhindert während der Schlacht im Orelbogen die Einschließung von zwei Armeen.
(19.-21. Juli 1943)

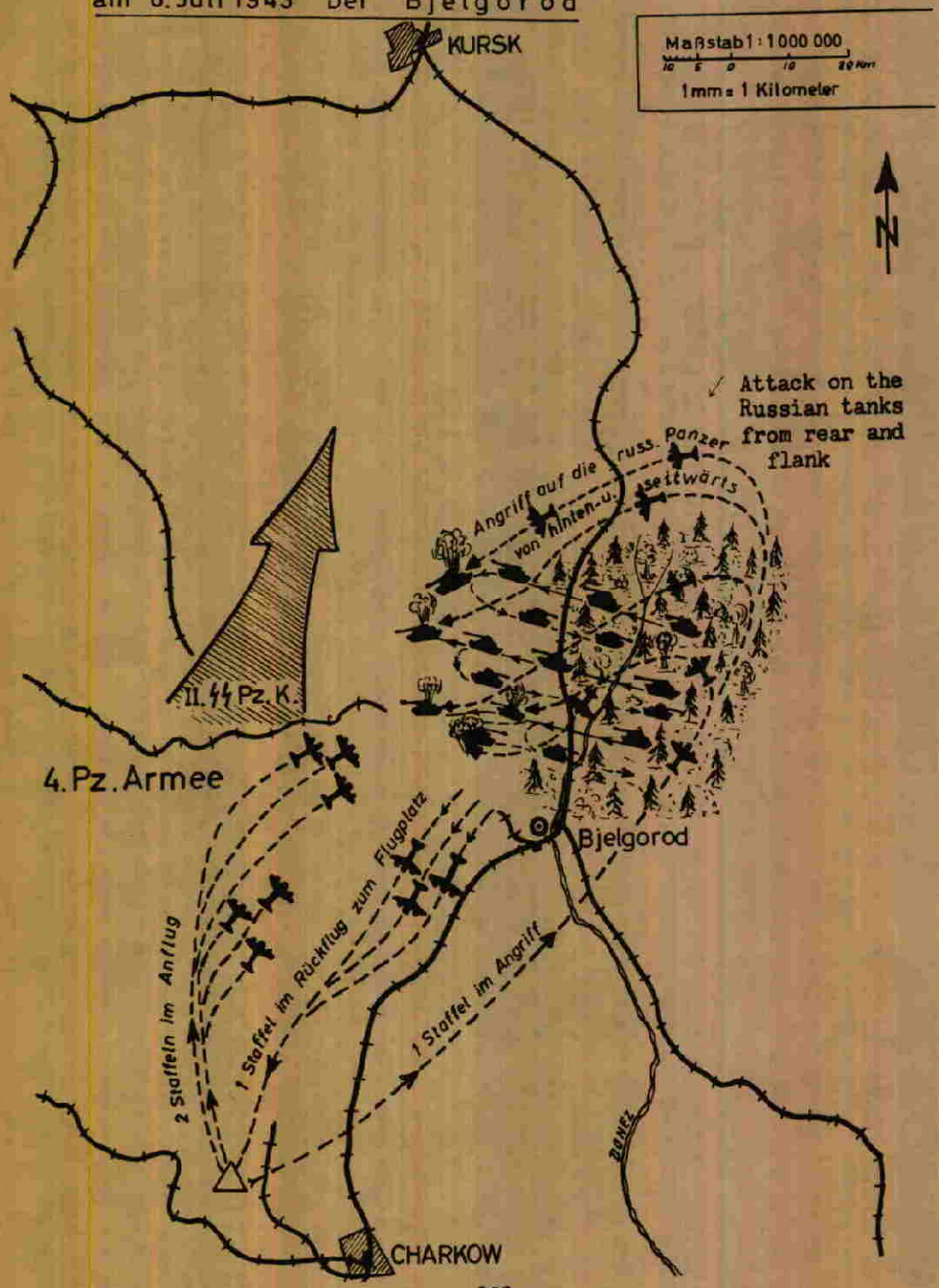


Anlage 20

(Operation IV Panzer Army and 9th Ground Attack Wing)

Einsatz der IV. Pz./S.G.9

am 8. Juli 1943 bei Bjelgorod



202

THIS PAGE DECLASSIFIED IAW EO12958

Anlage 21

Distribution of the Existing Operational Bomber Units

Aufteilung der im Einsatz befindlichen Kampffliegerverbaende

(Einsatzbereite Flugzeuge)

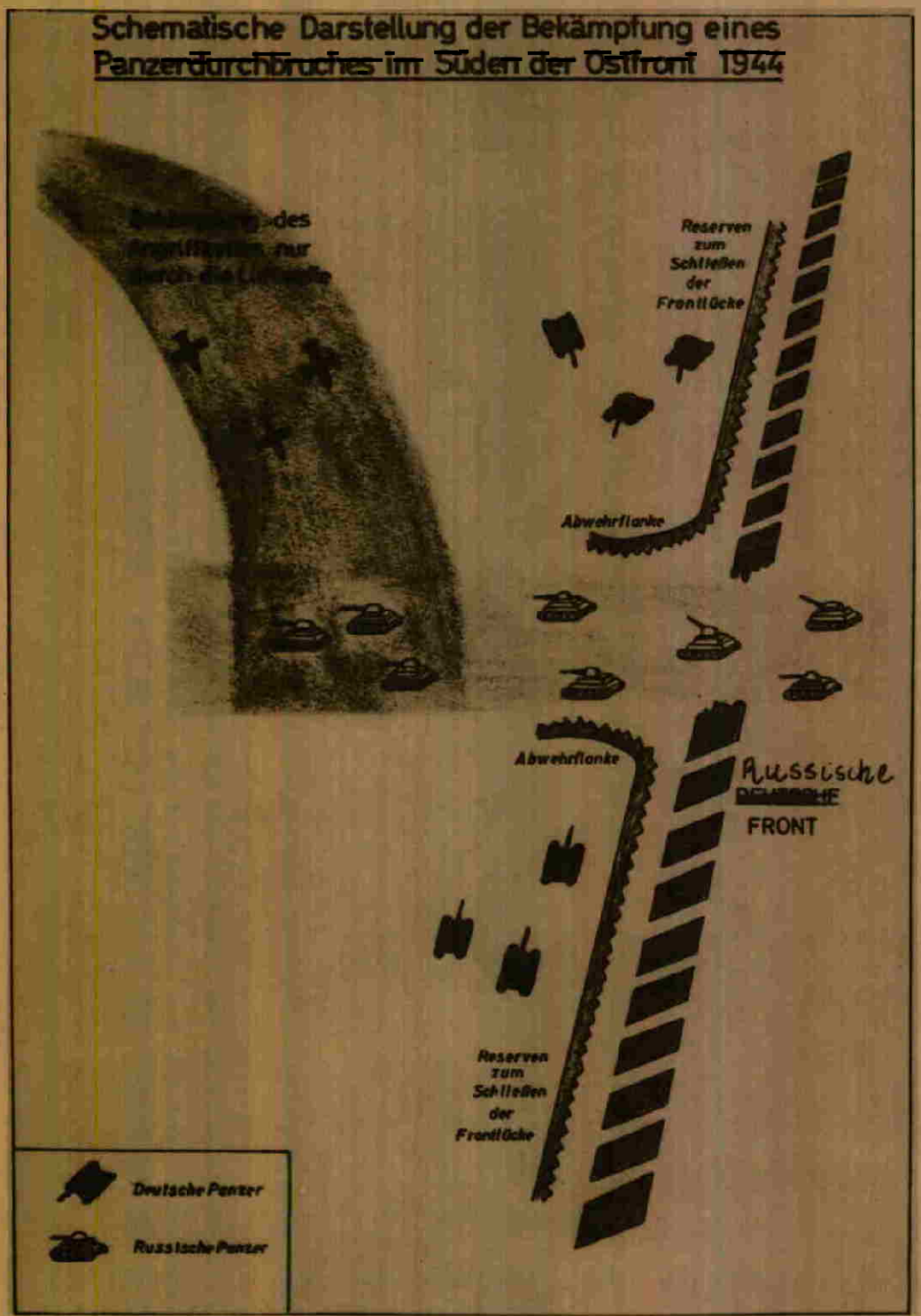
Zeitpunkt	Okt. 1943	Nov. 1943	Dez. 1943	Jan. 1944	Febr. 1944	März 1944	April 1944	Mai 1944	Juni 1944	Juli 1944	Aug. 1944	Sept. 1944	Okt. 1944	Nov. 1944	Dez. 1944	Jan. 1945
Im Norwegen	16	17	15	-	15		16	17	17	17	-	-	-	-	73	115
An der Ostfront																
Nordabschnitt	Nicht aufgegliedert	-	-		8	5o	7	3	4	6	12	6	5	5	-	-
Mitte		96	47		5	163	225	177	248	233	259	215	3o	-	11	11
Suedabschnitt		245	191		125	54	61	43	74	25	51	4	62	45	68	87
Insgesamt:	358	341	238		138	167	293	223	326	264	322	225	97	5o	79	98
Im Westen																
Nordfront								54	1o3	15o		88	123	61	?/	258
Westkueste (Atlantik)	459	3o2	695	456	429		125	19	22	28	246	-	-	-	-	-
Sueden (Mittelmeer)							62	71	59	28						
Im Sueden																
Italien	285	263	?	?	189	1o2	57	5o	keine	keine	64(?)	32	-			
Im Suedosten																
Balkan	5o	84	43	-	-	-	-	-	-	-				Einige Flugzeuge zur Versorgung		

Quellen: Lagekarten Ob.d.L.
Quartiermeistermeldungen

Bemerkung: Nicht aufgefuehrt sind die jeweils im Heimatgebiet zur Wiederaufruestung bzw. Umruestung befindlichen Bombergruppen.

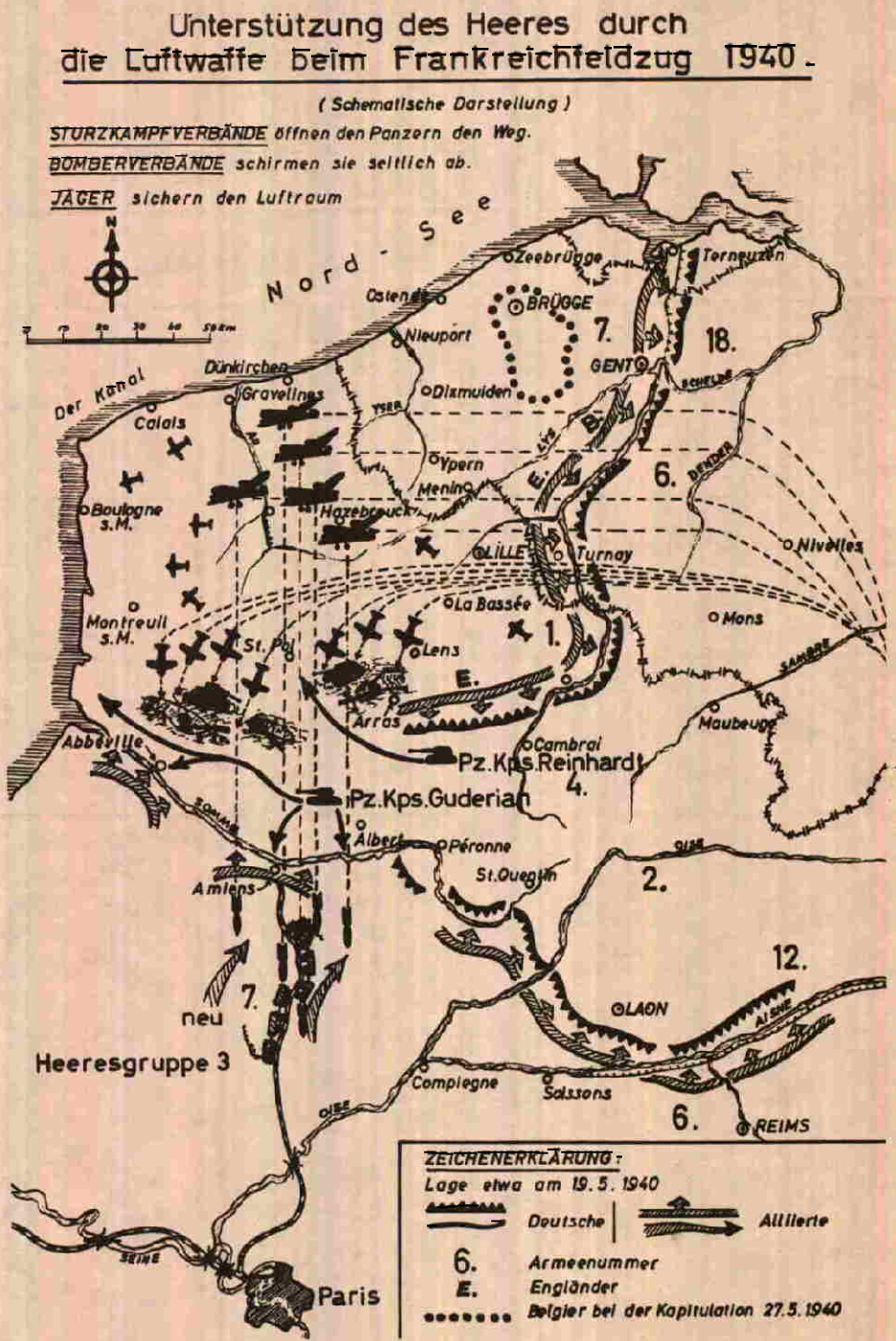
Anlage 22

(Schematic Presentation of Control of an Armored Breakthrough on the Eastern Front, South, 1944)



Anlage 23

(Ground Support by Luftwaffe in the Campaign in France, 1940)



Anlage 24

Comparative Survey of Flying Units and Antiaircraft Units Allocated to the Army in the East, 1941

Vergleichs-Übersicht über die dem Heer im Osten 1941 zugeteilten Heeresfliegerverbände u. Lw-Flakartillerie.

(Stand: 18. Juni 1941)

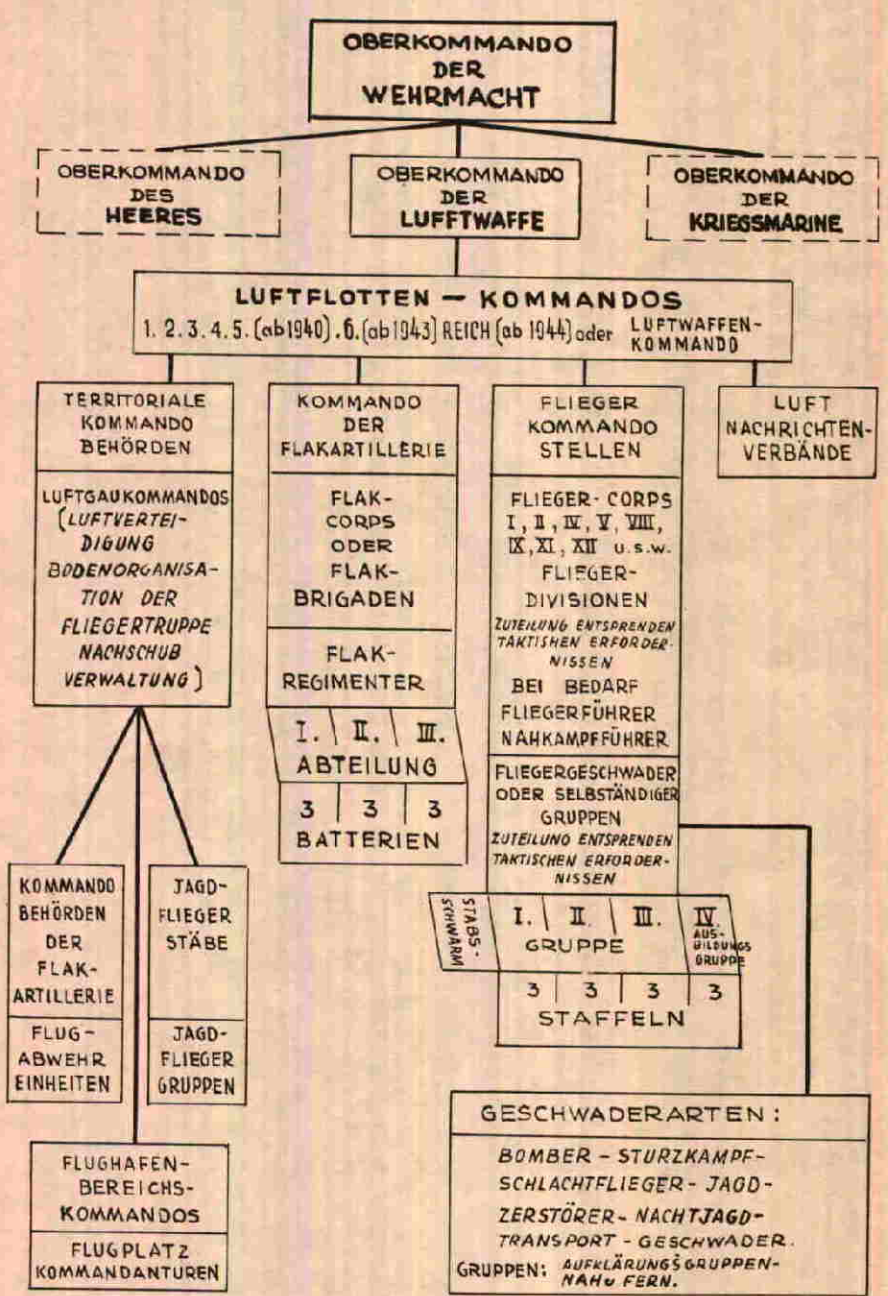
1	2	3	4	5	6	7	8	9	10
	Koluft	Fernaufkl.-Staffel	Nacht-Aufkl.-Staffel	Verbindungs Staffel	Aufkl. Gr. Stäbe	Aufkl. Staffel H	Luftwaffen- Flk. Rgts. Stä.	Flak-Abt.	Bemerkungen
Gen. der Lw. beim Ob.d.H.	-	2	-	1 (Kurier)	-	-	-	-	
Finnland	1	1	-	-	-	-	-	1	
Heeresgruppe Nord	1	1	1	-					
18. Armee	1	1	-	1	-	3	1	3	
16. Armee	1	-	-	1	-	3	1	3	
4. Panzergruppe	1	1	-	-	2	5	1	5 davon 3 lei. Abt.	
Heeresgruppe Mitte	1	2	1	1					
3. Panzergruppe	1	1	-	-	2	6	1	6 davon 4 lei. Abt.	
9. Armee	1	-	-	1	-	4	1	5	
4. Armee	1	-	-	1	-	5	1	5	
2. Panzergruppe	1	1	-	-	3	8	-	1 lei. Abt.	unterstützt durch 4 gem. und 2 lei. Abt. des I. Flakkorps
Heeresgruppe Süd	1	2	1	1					
6. Armee	1	-	-	1	-	4	1	3	
1. Panzergruppe	1	1	-	1	3	8	-	1 lei. Abt.	unterstützt durch 4 gem. und 2 lei. Abt. des II. Flakkorps
17. Armee	1	-	-	1	-	3	1	3	
11. Armee	1	1	-	1	-	3	1	3	
Summe:	15	14	3	11	10	52	9	39 davon 9 leicht	

THIS PAGE DECLASSIFIED IAW EO12958

Anlage 25

(Tactical Subordinate Relationships in the German Air Force)

TAKTISCHE UNTERSTELLUNGSVERHÄLTNISSE IN DER DEUTSCHEN LUFTWAFFE



APPENDIX NO. 26

LIST OF GAF MONOGRAPH PROJECT STUDIES

I. Published

Study No.	Title
163	German Air Force Operations in Support of the Army
167	German Air Force Airlift Operations
173	The German Air Force General Staff
175	The Russian Air Force in the Eyes of German Commanders
177	Airpower and Russian Partisan Forces
189	Historical Turning Points in the German Air Force War Effort

II. To Be Published

150	The German Air Force in the Spanish War
151	The German Air Force in Poland
152	The German Air Force in France and the Low Countries
153-55	The German Air Force versus Russia
156	The Battle of Britain
157	Operation Sea Lion
158-60	The German Air Force versus the Allies in the West
161	The German Air Force versus the Allies in the Mediterranean

THIS PAGE DECLASSIFIED IAW EO12958

Study No.	Title
162	The Battle of Crete
164	German Air Force Air Defense Operations
166	German Air Force Counter Air Operations
168	German Air Force Air-Sea Rescue Operations
169	Training in the German Air Force
170	Procurement in the German Air Force
171	Intelligence in the German Air Force
172	German Air Force Medicine
174	Command and Leadership in the German Air Force (Goering, Milch, Jeschonnek, Udet, Wever)
176	Russian Patterns of Reaction to the German Air Force
178	Problems of Fighting a Three-Front Air War
179	Problems of Waging a Day and Night Defensive Air War
180	The Problem of the Long-Range Night Intruder Bomber
181	The Problem of Air Superiority in the Battle with Allied Strategic Air Forces
182	Fighter-Bomber Operations in Situations of Air Inferiority
183	Analysis of Specialized Anglo-American Techniques
184	Effects of Allied Air Attacks on German Divisional and Army Organizations on the Battle Fronts
185	Effects of Allied Air Attacks on German Air Force Bases and Installations

THIS PAGE DECLASSIFIED IAW EO12958

Appendix No. 26 (Cont'd)

Study No.	Title
186	The German Air Force System of Target Analysis
187	The German Air Force System of Weapons Selection
188	German Civil Air Defense
190	The Organization of the German Air Force High Command and Higher Echelon Headquarters within the German Air Force
194	Development of German Antiaircraft Weapons and Equipment up to 1945
Extra Study	The Radio Intercept Service of the German Air Force